

MICREX-SX *series*

SPH

USER'S MANUAL

T-LINK MASTER MODULE

T-LINK INTERFACE MODULE

This User's Manual explains T-link master module, T-link interface module and T-link specifications of MICREX-SX series. Read this manual carefully to ensure correct

operation.

When using modules or peripheral devices, be sure to read the corresponding user's manuals listed below.

Title	Manual No.	Contents
User's Manual Instruction, MICREX-SX series SPH/SPS	FEH200	Explains the memory, language and system definitions of the MICREX-SX series.
User's Manual Hardware, MICREX-SX series SPH	FEH201	Explains the system configuration, the specifications and operations of modules in the MICREX-SX series.
User's Manual P/PE-link modules, MICREX-SX series SPH	FEH203	Explains the communication specifications of P/PE-link, the specifications and operations of the modules.
User's Manual D300win <Introduction>, MICREX-SX series	FEH250	Explains the basic operations of D300win, the programming and monitoring for MICREX-SX series.
User's Manual D300win <Reference>, MICREX-SX series	FEH251	Explains the menu and icon of D300win and all of the operations of D300win.

Notes

1. This manual may not be reproduced in whole or part in any form without prior written approval by the manufacturer.
2. The contents of this manual (including specifications) are subject to change without prior notice.
3. If you find any ambiguous or incorrect descriptions in this manual, please write them down (along with the manual No. shown on the cover) and contact FUJI.

Safety Precautions

Be sure to read the “Safety Precautions” thoroughly before using the module.

Here, the safety precaution items are classified into “Warning” and “Caution.”



Warning

: Incorrect handling of the device may result in death or serious injury.




Caution

: Incorrect handling of the device may result in minor injury or physical damage.

Even some items indicated by “Caution” may also result in a serious accident.

Both safety instruction categories provide important information. Be sure to strictly observe these instructions.

 Warning
<ul style="list-style-type: none">◇ Never touch any part of charged circuits as terminals and exposed metal portion while the power is turned ON. It may result in an electric shock to the operator.◇ Turn OFF the power before mounting, dismounting, wiring, maintaining or checking, otherwise, electric shock, erratic operation or troubles might occur.◇ Place the emergency stop circuit, interlock circuit or the like for safety outside the PC. A failure of PC might break or cause problems to the machine.◇ Do not connect in reverse polarity, charge (except rechargeable ones), disassemble, heat, throw in fire or short-circuit the batteries, otherwise, they might burst or take fire.◇ If batteries have any deformation, spilled fluids, or other abnormality, do not use them. The use of such batteries might cause explosion or firing.◇ Do not open the FG terminal with the LG-FG short circuited. (It must be grounded, otherwise it might cause electric shock.)

Safety Precautions

Caution

- ◇ Do not use one found damaged or deformed when unpacked, otherwise, failure or erratic operation might be caused.
- ◇ Do not shock the product by dropping or tipping it over, otherwise, it might be damaged or troubled.
- ◇ Follow the directions of the operating instructions when mounting the product. If mounting is improper, the product might drop or develop problems or erratic operations.
- ◇ Use the rated voltage and current mentioned in the operating instructions and manual. Use beyond the rated values might cause fire, erratic operation or failure.
- ◇ Operate (keep) in the environment specified in the operating instructions and manual. High temperature, high humidity, condensation, dust, corrosive gases, oil, organic solvents, excessive vibration or shock might cause electric shock, fire, erratic operation or failure.
- ◇ Select a wire size to suit the applied voltage and carrying current. Tighten the wire terminals to the specified torque. Inappropriate wiring or tightening might cause fire, malfunction, failure, or might cause the product to drop from its mounting.
- ◇ Contaminants, wiring chips, iron powder or other foreign matter must not enter the device when installing it, otherwise, erratic operation or failure might occur.
- ◇ Connect the ground terminal to the ground, otherwise, an erratic operation might occur.
- ◇ Periodically make sure the terminal screws and mounting screws are securely tightened. Operation at a loosened status might cause fire or erratic operation.
- ◇ Put the furnished connector covers on unused connectors, otherwise, failure or erratic operation might occur.
- ◇ Install the furnished terminal cover on the terminal block, otherwise, electric shock or fire might occur.
- ◇ Sufficiently make sure of safety before program change, forced output, starting, stopping or anything else during a run. The wrong operation might break or cause machine problems.
- ◇ Engage the loader connector in a correct orientation, otherwise, an erratic operation might occur.
- ◇ Before touching the PC, discharge any static electricity that may have been collected on your body. To discharge it, touch a grounded metallic object. Static electricity might cause erratic operation or failure of the module.
- ◇ Be sure to install the electrical wiring correctly and securely, observing the operating instructions and manual. Wrong or loose wiring might cause fire, accidents, or failure.
- ◇ When disengaging the plug from the outlet, do not pull the cord, otherwise, break of cable might cause fire or failure.
- ◇ Do not attempt to change system configurations (such as installing or removing I/O modules) while the power is ON, otherwise, failure or erratic operation might occur.
- ◇ Do not attempt to repair the module by yourself -- contact your Fuji Electric agent. When replacing the batteries, correctly and securely connect the battery connectors, otherwise, fire, accidents or failure might occur.
- ◇ To clean the module, turn power off and wipe the module with a cloth moistened with warm water. Do not use thinner or other organic solvents, as the module surface might become deformed or discolored.
- ◇ Do not remodel or disassemble the product, otherwise, a failure might occur.
- ◇ Follow the regulations of industrial wastes when the device is to be discarded.
- ◇ The modules covered in these operating instructions have not been designed or manufactured for use in equipment or systems which, in the event of failure, can lead to loss of human life.
- ◇ If you intend to use the modules covered in these operating instructions for special applications, such as for nuclear energy control, aerospace, medical, or transportation, please consult your Fuji Electric agent.
- ◇ Be sure to provide protective measures when using the module covered in these operating instructions in equipment which, in the event of failure, may lead to loss of human life or other grave results.

*Manual No. is shown on the cover.

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Preface

Safety Precautions

Revision

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Section 1 General

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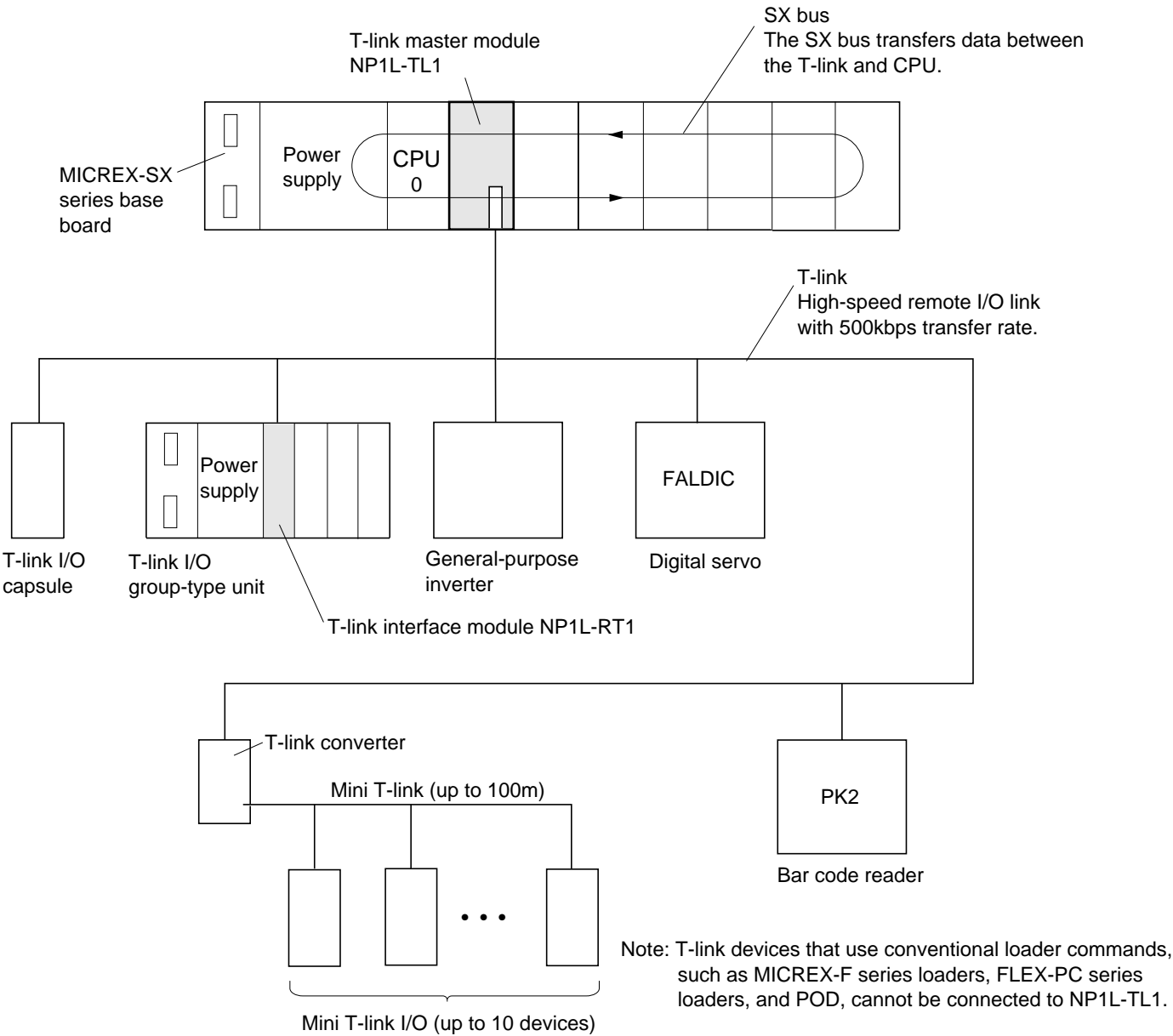
Section 1 General

1-1 T-link System Configuration

The T-link master module NP1L-TL1 is mounted on the MICREX-SX series base board (connected to the SX bus).

This module controls one T-link system which is the Fuji Electric-specific high-speed serial communication network.

Various types of T-link devices can be connected as shown in the figure below.



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Item		Specification
Physical environmental conditions	Operating ambient temperature	0 to 55° C
	Storage temperature	-25 to +70° C
	Relative humidity	20 to 95%RH no condensation (Transport condition: 5 to 95%RH no condensation)
	Pollution degree	2
	Corrosion immunity	Free from corrosive gases. Not stained with organic solvents.
	Operating altitude	2000m or less above sea level (Transport condition: 70kPa or more)
Mechanical service conditions	Vibration	Half amplitude: 0.15mm, Constant acceleration: 19.6m/s ² , Two hours for each of three mutually perpendicular axes, total six hours.
	Shock	Acceleration peak: 147m/s ² Three times for each of three mutually perpendicular axes.
Electrical service conditions	Noise immunity	1.5kV, rise time 1ns, pulse width 1μs (noise simulator)
	Electrostatic discharge	Contact discharge: ± 8kV Aerial discharge: ± 15kV
	Radioelectromagnetic field	10V/m (80MHz to 1000MHz)
Construction		Panel-mounted type
Cooling		Air cooling
Isolation method		Photocoupler
Dielectric strength		445V AC 1 minute (between connector pins and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between connector pins and frame ground)
Internal current consumption		NP1L-TL1: 24V DC, 140mA or less, NP1L-RT1: 24V DC, 140mA or less
Mass		NP1L-TL1: Approx. 200g, NP1L-RT1: Approx. 200g
Dimensions		Described in 2-5

2-2 T-link Communication Specifications

2-2-1 Communication specifications

Item	Specification
No. of connectable devices	T-link system slave stations per master module (one T-link system): Max. 32
No. of I/O points	Digital I/O conversion (per T-link system): Max. 128 words (2,048 points)
Transmission line format	Bus configuration (multi-drop) Optical loop connection through optical converters on each bus (Loops can be duplicated.)
Transmission line	Bus transmission line: Twisted pair cable (1 pair) Total length: Max. 1km Optical transmission line: SI/GI quartz fiber cable (length between optical converters: Max. 1km/3km)
Transmission method	Half-duplex, serial transmission
Data exchange method	1 : N (polling/selecting) method
Transmission speed	500kbps
Effective transmission speed	7kbytes/sec. (10ms/512 digital points)
Modulation method	PDM (Pulse Duration Modulation)
Error check	FCS (frame check sequence)
Duplication of transmission line	Optical converters enable duplication of optical transmission lines.

2-2-2 Basics of T-link transmission

Data transmission on the T-link uses the polling/selecting method. In the polling/selecting method, the master module first talks to a slave station with the specified station number,

then the slave station responds to it. This section describes the basics of the data transmission.

(1) Initial transmission

When the power is turned on, the master module performs initial transmission before starting to operate. That is, the master module checks the I/O configuration, and the address of (the station number) slave stations connected to the T-link when the power is turned on. The master module checks from station 0 to station 99 in sequence. After checking them completely, the master module starts to operate. When the results of the check are different from settings in the system configuration definition, the “SER” (setting error) lamp lights indicating a configuration error (fatal fault).

(2) Normal transmission

After initial transmission, the T-link enters normal transmission mode. In this mode, CPU exchanges I/O data with slave stations that have been already checked for their connections with the T-link in initial transmission, in ascending order by their numbers. When CPU exchanges data with the final station, CPU repeats the data exchange with them. This cycle is called a “transmission cycle.”

(3) Transmission errors

When an error occurs during T-link transmission, data transmission fails. The master module will retry transmission. An error may occur due to power interruption of a slave station, disconnection of a T-link cable, noise, or malfunction of T-link transmission elements in the master module or slave station. If communication returns to a normal state after transmission retry, T-link transmission continues and the master module continues its operation. If communication still fails after transmission retry has been repeated three times for the same slave station, the master module regards it as a fatal fault and stops operation. In this case, the master module cannot return to operation until the cause of the fault is removed and the master module power supply is reset. However, if fail-soft operation is specified, the CPU module regards it as a nonfatal fault and continues operation.

2-2 T-link Communication Specifications

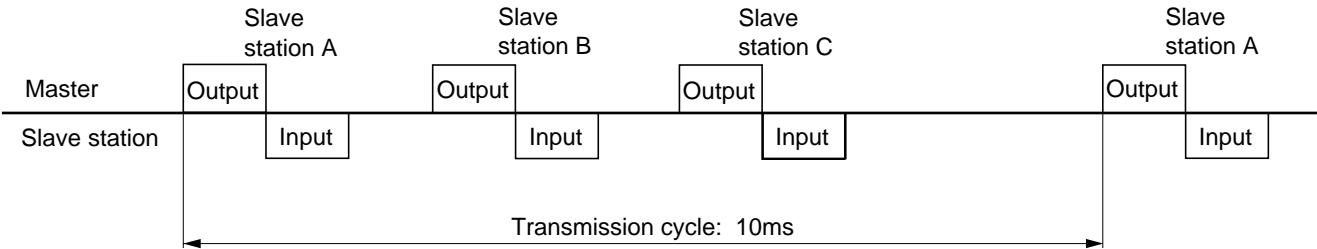
2-2-3 Transmission types

The T-link handles I/O transmission and message transmission.

(1) I/O transmission

I/O transmission is a high-speed communication method enabling transmission of signals from distributed I/O devices to the PC. On the T-link data refresh is usually performed

every 10ms. However, if one T-link system is connected to a large number of I/O devices or there are a large number of occupied words, the refresh cycle may exceed 10ms.

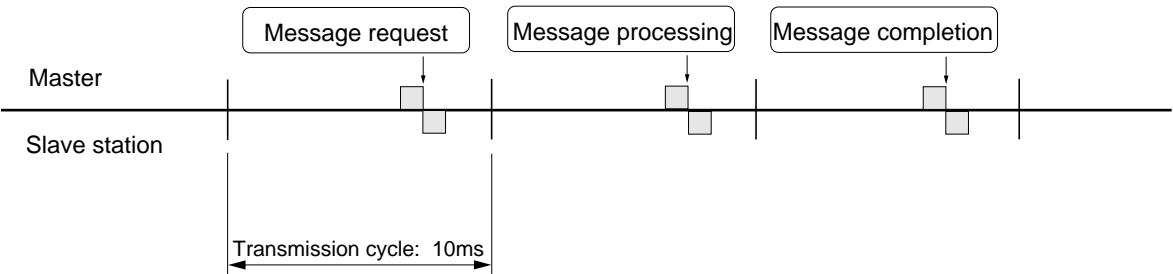


(2) Message transmission

Message transmission is a way to transfer a large amount of data between the CPU and slave stations. The T-link takes several I/O transmission cycles from the beginning of a request for a message to its completion (until data delivery is completed), thus message transmission is slower than I/O transmission. Also, the master module handles message

transmission for one station at a time. Therefore, when many devices that use message transmission (such as POD) are connected to one master module, the transmission rate becomes slower in proportion to the number of connected devices.

<Example of message transmission>



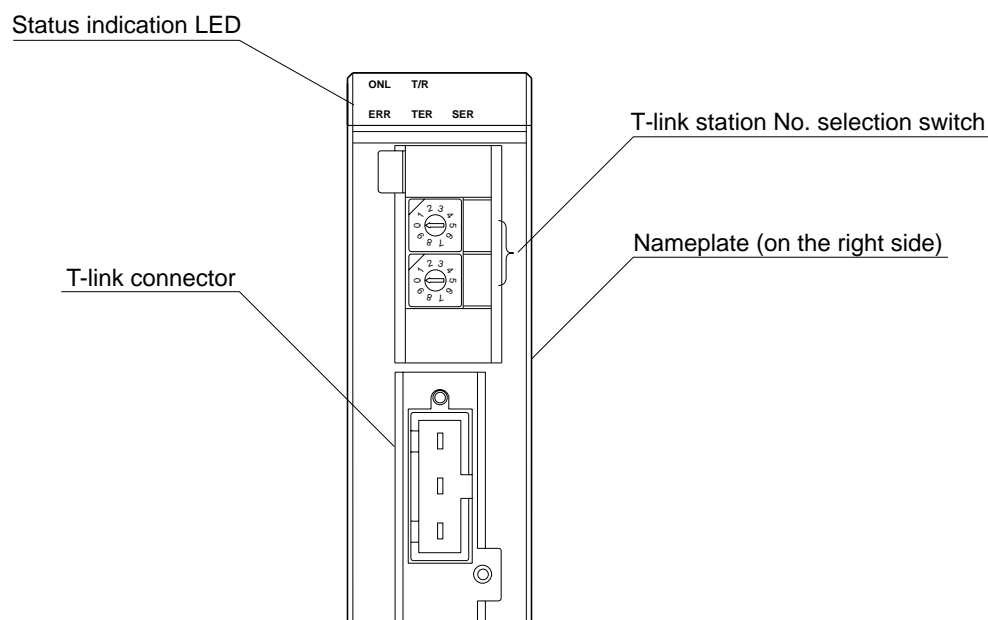
Cables that meet the following specifications should be used for the T-link cables.

Maker	Cable type		Maximum length		Remarks
			T-link	Mini T-link	
The Furukawa Electric Co., Ltd., Japan	KPEV-SB	0.75mm ² x 1 pair	700m	100m	Twisted pair cable
	T-KPEV-SB	1.25mm ² x 1 pair	1000m	100m	
	KPEV-SB	0.5mm ² x 1 pair	700m	100m	
Daiden Co., Ltd., Japan	RMEV-SB	0.5mm ² x 1 pair	290m	100m	Cable used for robot
Taiyo Electric Wire & Cable Co., Ltd., Japan	RVV-SB	0.5mm ² x 1 pair	200m	100m	Cable used for robot
Sumitomo Electric Industries Co., Ltd., Japan	TWIN-100		250m	100m	
	DPEV-SB	0.5mm ² x 1 pair	700m	100m	
Fujikura Cable Works Co., Ltd.	IPEV	0.5mm ² x 1 pair	700m	100m	
Hien Denko Co., Ltd.	TTYCS-1	x 1 pair	100m	100m	Cable used for vessel
	250V-TTYCYS	x 1 pair	50m	50m	
Nippon Cables Co., Ltd.	KPEV-SB	0.5mm ² x 1 pair	700m	100m	
	KNPEV-SB	0.5mm ² x 1 pair	700m	100m	

Note: The maximum length values in the above table are confirmed by Fuji.

2-4-1 NP1L-TL1 (T-link master module)

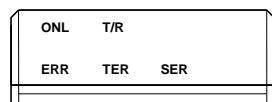
(1) Names



(2) Functions

1) Status indication LED

This LED indicates the NP1L-TL1 operation status.



Symbol	Color	Description:
ONL	Green	Turns on when the master module is operating normally (when the SX bus operates normally).
ERR	Red	Turns on when an error has occurred in the master module or SX bus.
T/R	Green	Turns on when T-link data is being transferred or recieved.
TER	Red	Turns on when a nonfatal fault has occurred in a unit on the T-link, a registered station has become disconnected, or a transmission error has occurred.
SER	Red	Turns on when there is an error in the system configuration.

<Example of LED status indications>

Common indicators		Individual indicators			Module status
ONL	ERR	T/R	SER	TER	
Blinks	—	—	—	—	The module is waiting for initialization of the SX bus. (common for all stations)
On	—	Blinks	—	—	The module is operating normally.
On	—	Blinks	—	*	(*: The transmission error LED indicator blinks sometimes, but the module can continue operation.)
—	On	—	—	—	The local module has a hardware fault or SX bus error. (module fatal fault)
On	—	Blinks	—	—	Remote I/O has a fault. (remote I/O fatal fault)
On	—	Blinks	On	—	Remote I/O configuration has a fault. (remote I/O nonfatal fault)
—	—	—	—	—	24V DC power is not connected.

Note: “—” indicates that the LED is OFF.

2) T-link station No. selection switch

Not used on this module (NP1L-TL1).

3) T-link connector

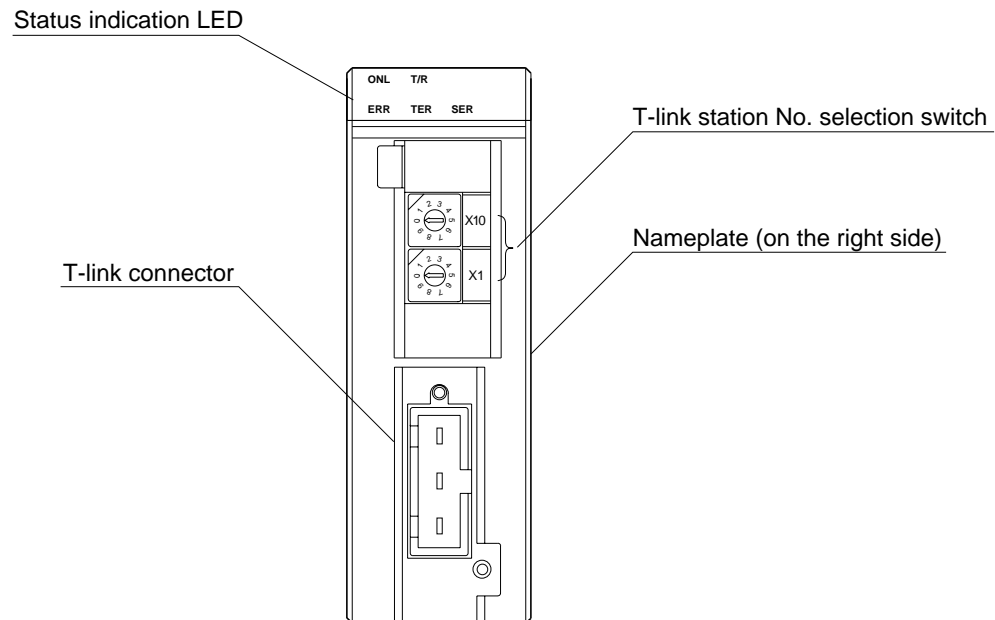
This connector is used to connect the T-link connector. The tightening torque for the connector fixing screw should be between 0.9 to 1.0N·m. For assembly of the T-link connector, refer to Section 5-2.

4) Nameplate

The type, production date, and serial number are printed on the right side of the module.

2-4-2 NP1L-RT1 (T-link interface module)

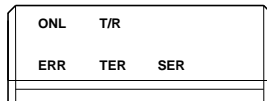
(1) Names



(2) Functions

1) Status indication LED

This LED indicates the NP1L-RT1 operation status.



Symbol	Color	Description:
ONL	Green	Turns on when the interface module is operating normally.
ERR	Red	Turns on when an error has occurred in the interface module or a unit on the T-link.
T/R	Green	Turns on when T-link data is being transferred or received.
TER	Red	Turns on when a nonfatal fault has occurred in a unit on the T-link, or a station registered in the configuration cannot be found.
SER	Red	Turns on when there is an error in a system definition.

<Example of LED status indications>

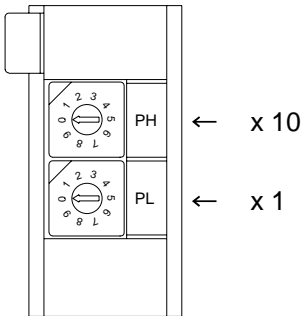
Common indicators		Individual indicators			Module status
ONL	ERR	T/R	SER	TER	
—	—	—	—	—	The interface module has not been initialized.
On	—	Blinks	—	—	The module is operating normally.
On	—	Blinks	On	*	A nonfatal fault has occurred.
—	On	—	—	—	A fatal fault has occurred.
On	—	On	—	On	A transmission error has been detected.
—	On	—	On	—	There is a setting error (such as a station number change during transmission).

Note: 1) “—” indicates that the LED is OFF.

2) When I/O transmission is not started, ONL is not ON.

2) T-link station No. selection switch

This switch is used to specify the T-link station number.
Range: 00 to 99



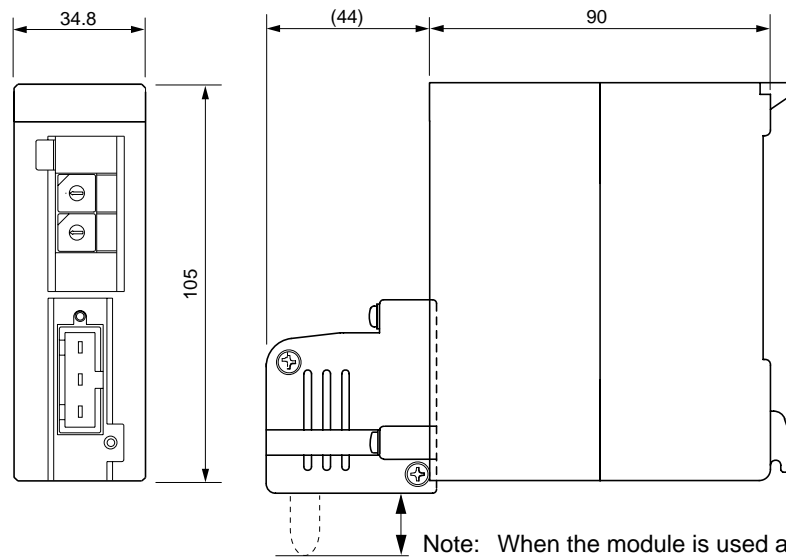
3) T-link connector

This connector is used to connect the T-link connector. The tightening torque for the connector fixing screw must be between 0.9 to 1.0N·m. For assembly of the T-link connector, refer to Section 5-2.

4) Nameplate

The type, production date, and serial number are printed on the right side of the module.

The dimensions of NP1L-TL1 and NP1L-RT1 are identical.



Note: When the module is used as the end terminal of the T-link, a T-link terminating resistor must be attached. When the resistor is attached, an approximately 22mm to 24mm protrusion is added.

Section 3 System Configuration

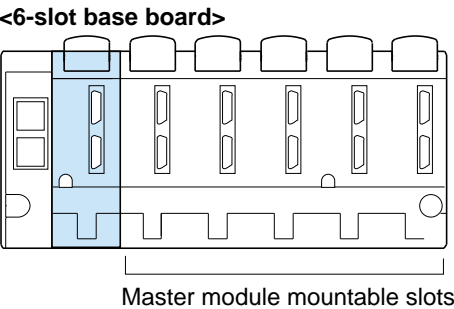
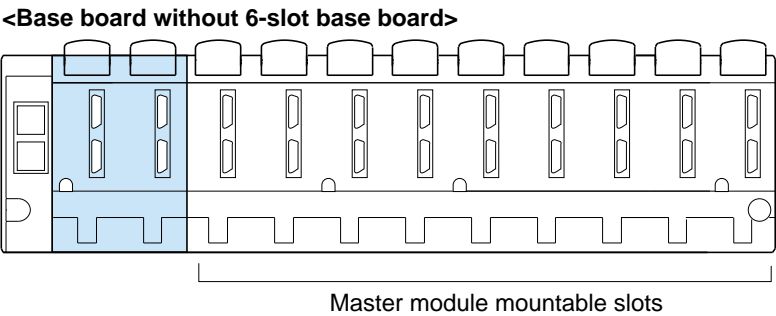
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3-1-1 Mounting position

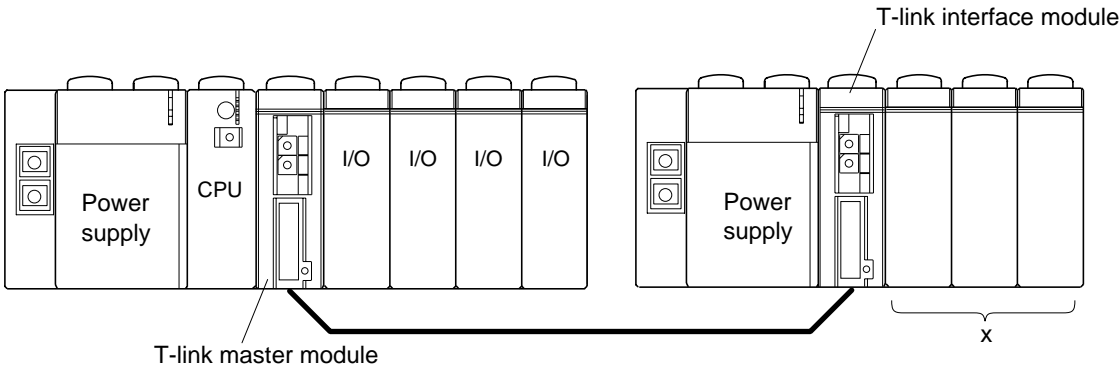
(1) T-link master module NP1L-TL1

The NP1L-TL1 is the remote I/O master module which is connected to the SX bus. The figure below shows the slots on the base board to which a master module can be mounted.

The master module can be mounted on any slot except for the power supply module mounting slots (the first and second slots from the left on the base board).



Note: A T-link master module can not be mounted on the base board of a T-link or JPCN-1 slave station.



(2) T-link interface module NP1L-RT1

The NP1L-RT1 is mounted on the base board of a T-link slave station. The interface module must be mounted on the right side of the power supply module.

3-1-2 Number of mountable modules

Up to 8 NP1L-TL1 modules can be mounted for one SX bus system. However, if another I/O master module (such as a JPCN-1 master module) is mounted, the number of mountable modules is a total of 8.

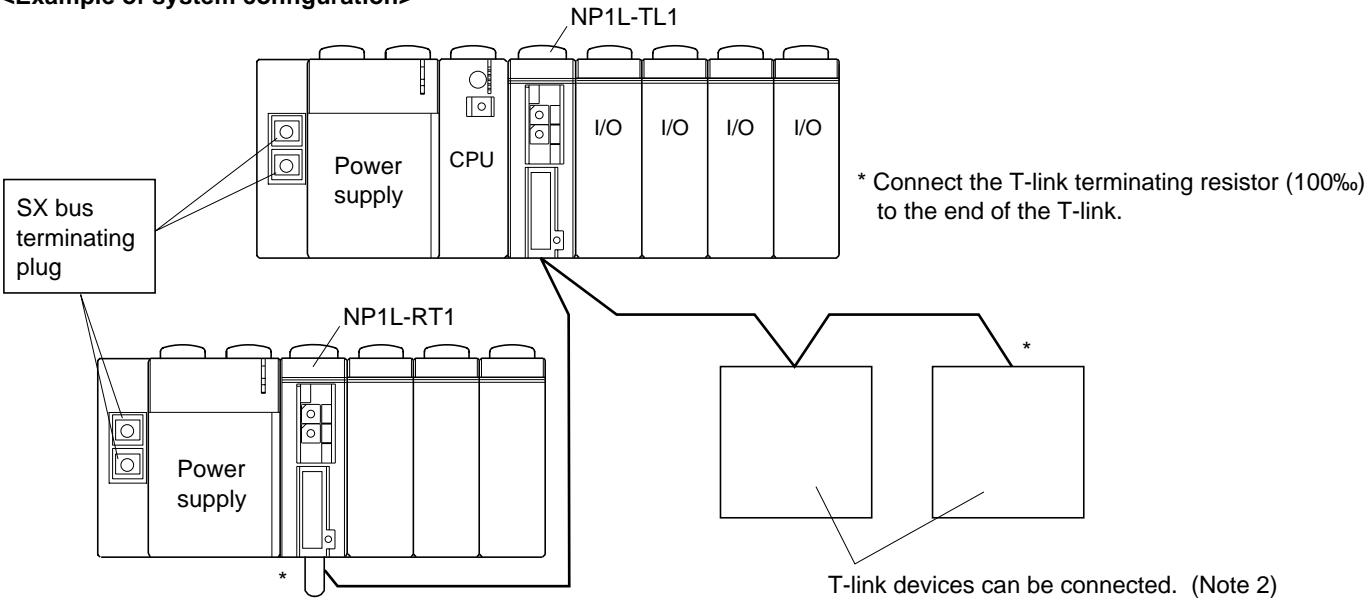
$$(\text{Number of mountable T-link master modules}) + (\text{Number of mountable other I/O master modules}) \leq 8$$

A base board can contain only one NP1L-RT1 module.

3-2-1 Basic system configuration

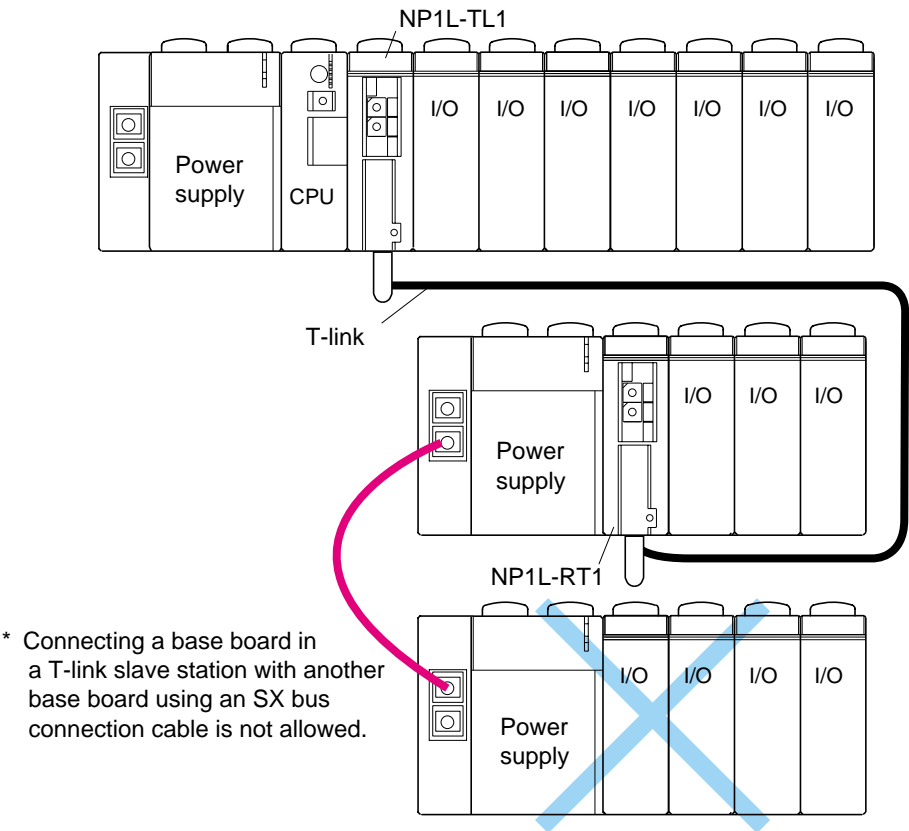
Connecting one NP1L-TL1 master module with the MICREX-SX series SX bus (on the base board) enables one T-link system configuration to be constructed.

<Example of system configuration>



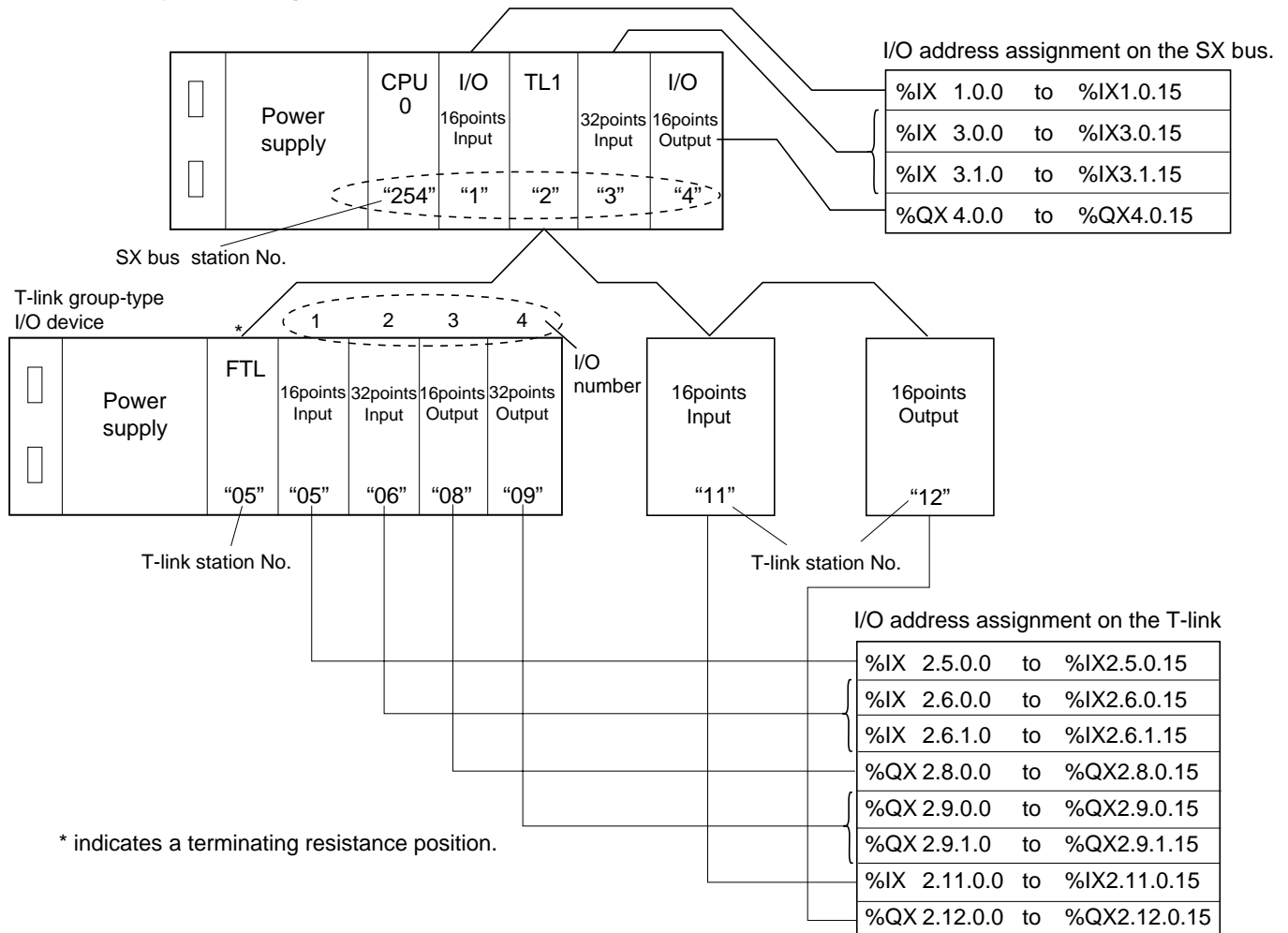
The T-link interface module (NP1L-RT1) enables MICREX-SX series SPH I/O modules to be used as T-link devices.

- Note: 1) The allowable distance depends on the type of the cable used. For the details, refer to “2-3 Cable Specifications.”
- 2) Devices that use different loader commands such as MICREX-F series loaders, FLEX-PC series loaders, and POD cannot be connected.
- 3) The configuration shown below is not possible.

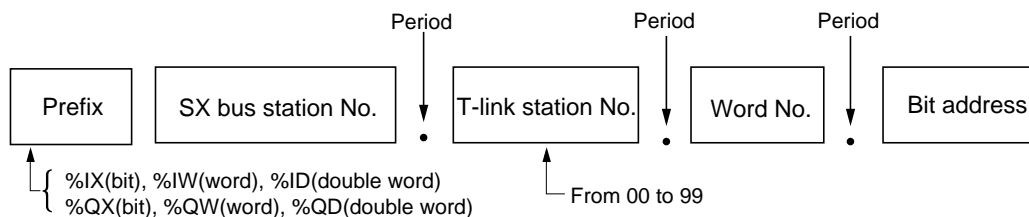


3-2-2 I/O address assignment

I/O address assignment is shown below.

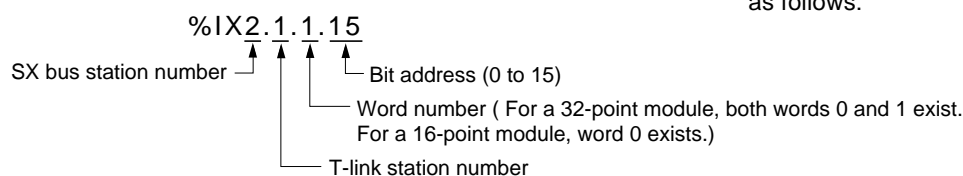
<Example of system configuration>**<Addressing modes>**

In MICREX-SX series, the I/O addresses on the SX bus are assigned to the same I/O area as the I/O addresses on the T-link.

**<Address number assignments>**

The address of each I/O module mounted on the T-link group type I/O device needs the T-link station number and the word number which indicates the order in the device.

Example: In the sample system configuration shown above, the address of the bit 32 position of the 32-point input module (the module at far right) on the T-link group type I/O device would be expressed as follows:

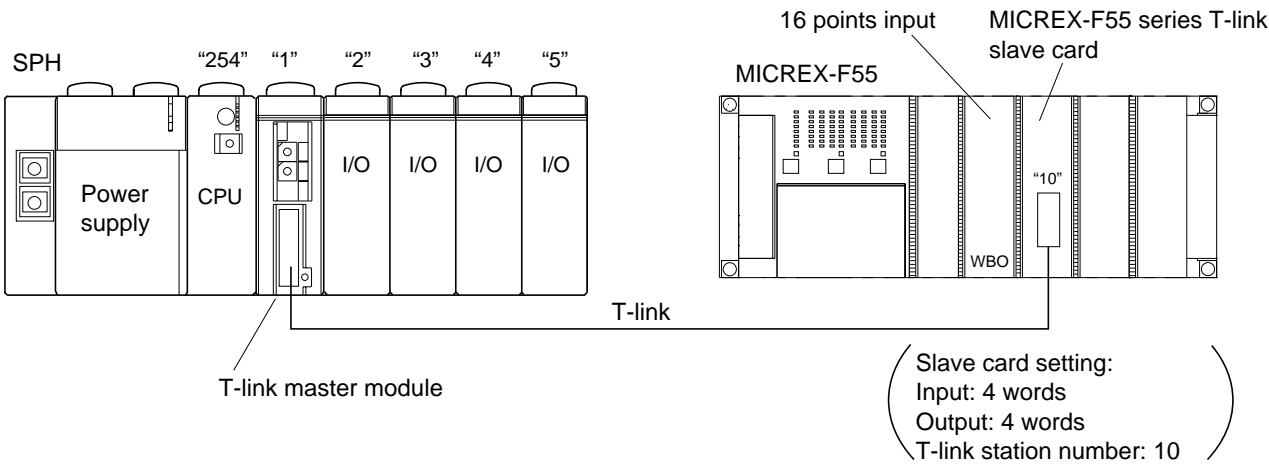


3-2-3 Communication system with other series using T-link slaves

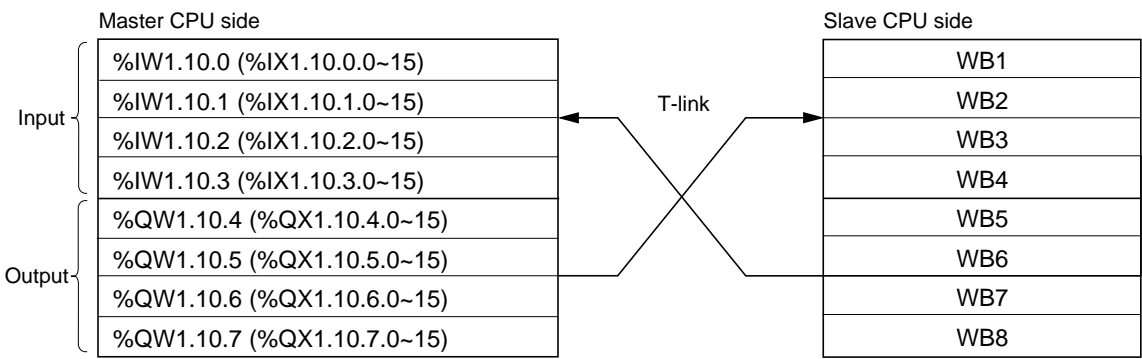
Using MICREX-F series or FLEX-PC series T-link slave modules, data can be transferred through T-link between

MICREX-SX series SPH CPUs and MICREX-F series or FLEX-PC series CPUs.

<Example of connection to MICREX-F55 series>
The MICREX-SX series CPU is the master, and the MICREX-F55 series CPU is a slave.



<Assignment of I/O addresses>



3-2-4 T-link system using the T-link electric repeater/converter

(1) Overview of the T-link Electric Repeater (FRC200A-C10)

The FRC200A, with the functions listed below, allows flexible T-link network configurations.

- Extension of the T-link transmission distance
Two repeaters can be used for one T-link system. The transmission distance can be extended up to 3 km.
- Branching of transmission line
T-branches can be used.

- Connection with mini T-link

The repeater supports mini T-link. The repeater has four pairs of terminals for connecting cables. (Terminal names: T-link 1, T-link 2, T-link 3, mini T-link)

Either the T-link 3 connectors or mini T-link connectors can be used by setting a switch.

Note: 1) When the FRC200A repeaters are located at each end of the T-link, or for unused link connectors, connect the supplied terminating resistor (100Ω/1 W). For the T-link 3 connectors and mini T-link connectors, it is not necessary to connect the terminating resistor to the connectors that are not selected by the switch.

2) For the T-link 3 connectors and mini T-link connectors, signals are transmitted to the connectors selected by the switch.

(2) Overview of the T-link converter (FRC100A-G02)

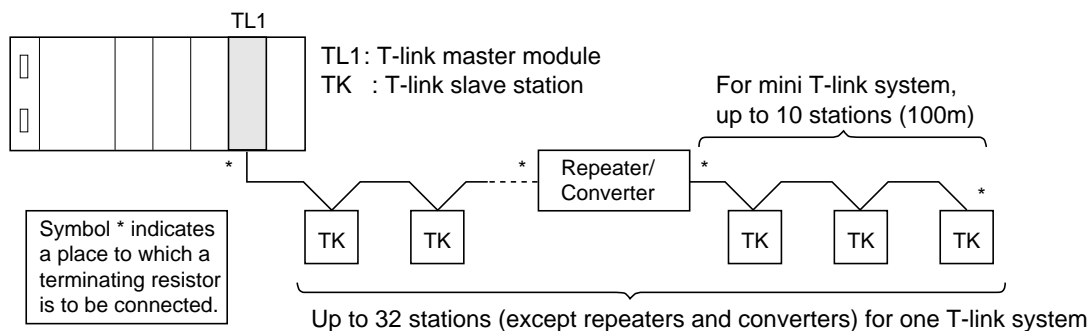
The FRC100A converts T-link signals to mini T-link signals (and vice versa) to support connections with various T-link

I/O devices or mini T-link I/O devices.

Note: For terminating of the T-link or mini T-link transmission lines, connect the supplied terminating resistor (100Ω/1 W).

(3) Notes on connecting T-link electric repeaters and T-link converters

Note the restrictions described below for T-link (mini T-link) system construction.

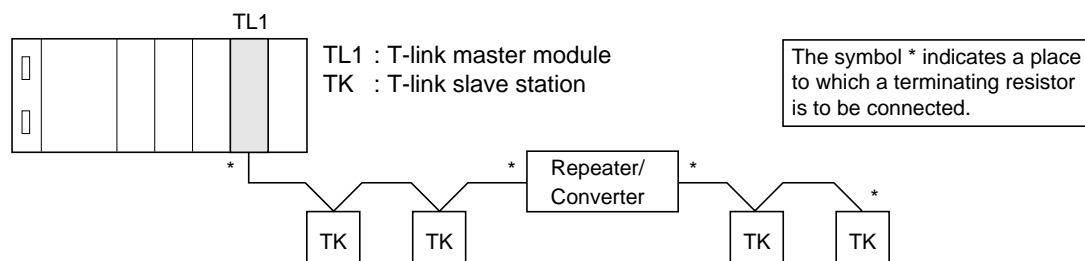


<Number of repeaters and converters usable for one T-link system>

	Serial connection	Parallel connection
T-link converter (FRC100A-G02)	1	2
T-link electric repeater (FRC200A-C10)	2	2

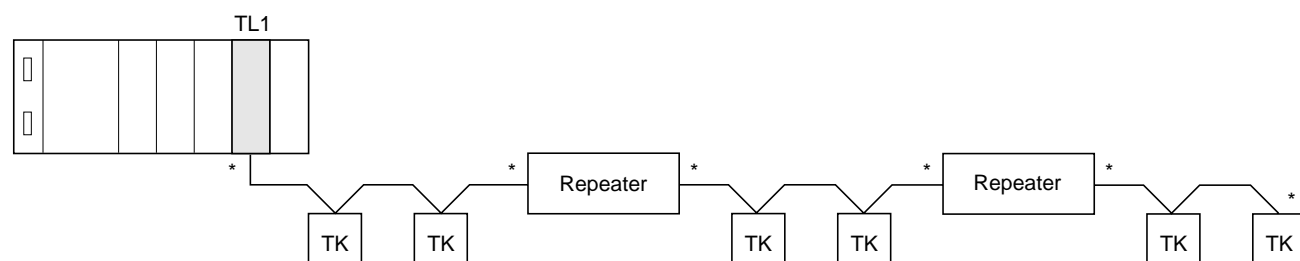
(4) Examples of system configurations

1) One repeater/converter in series

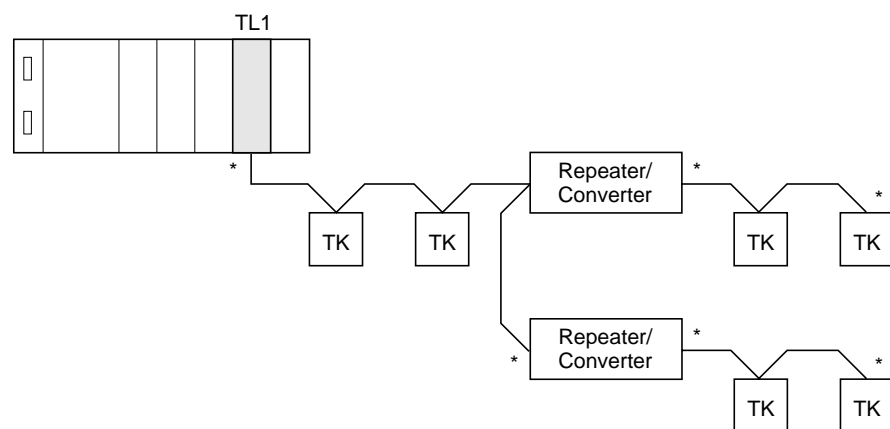


2) Two repeaters in series

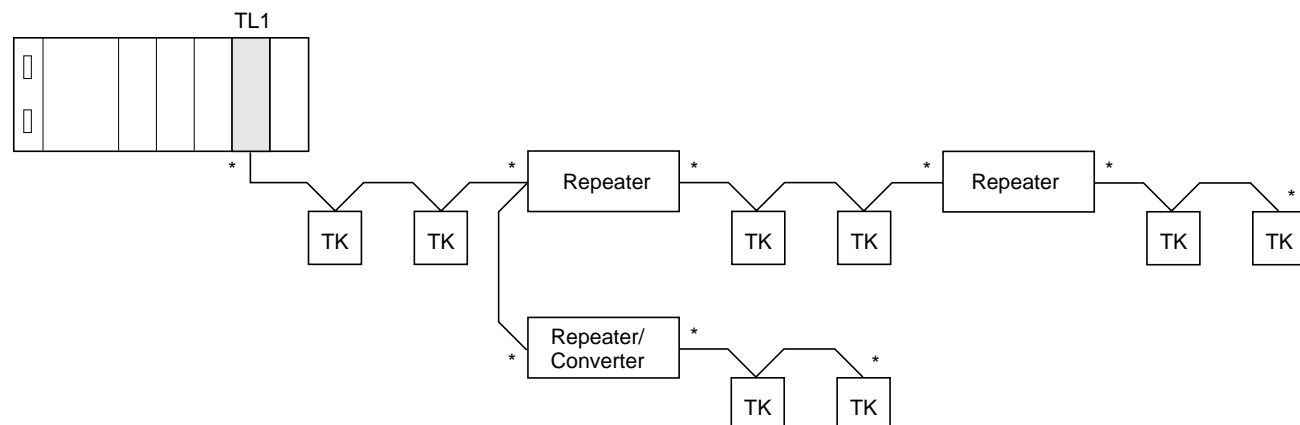
This configuration is allowed only for the T-link electric repeater (FRC200A-C10).



3) Repeater/converters in parallel



4) Repeater/converters in series and parallel



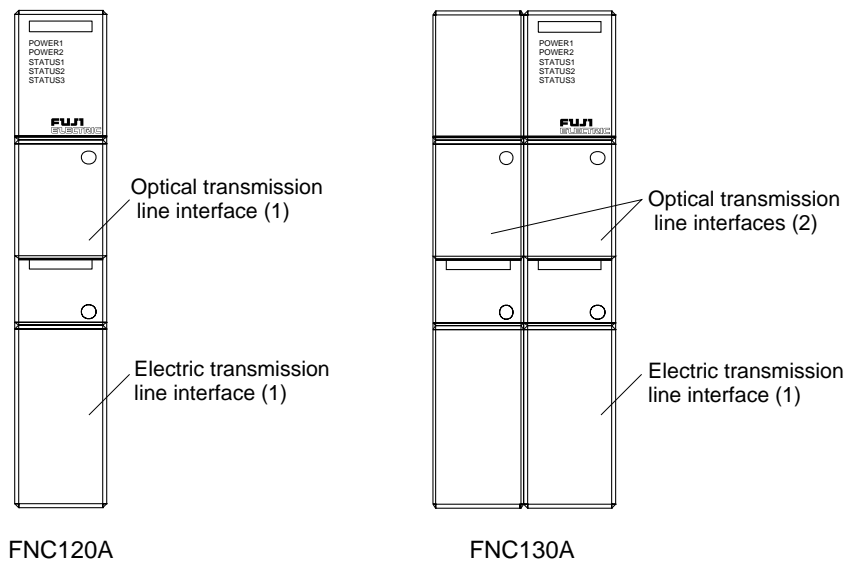
3-2-5 System configuration using the T-link optical converter

The allowable length of the T-link can be extended using optical transmission lines. Optical transmission lines are minimally affected by noise, thus optical transmission lines

provide transmission lines suitable for use with noise-generating devices.

(1) Overview of the T-link optical converter

There are two types of T-link optical converter available: simple type FNC120A and high performance type FNC130A.



<Communication specifications>

Item		Specification	
Transmission speed		500kbps	
Electric	Cable	Twisted pair cable (shielded)	
	Total length	Max. 1km	
Optical	Cable	SI multi-component glass fiber Core/clad diameter: 200μm/250μm	GI quartz fiber Core/clad diameter: 50μm/125μm
	Total length	Max. 1km	Max. 1km

<Optical adapter specifications>

Type	Applicable converter	Applicable fiber	Optical connector
FTC130T	FNC120A FNC130A	SI multi-component glass fiber, 200/250μm	F 06/08 (JIS C 5975, 8)
FTC132S		GI quartz fiber, 50/125μm	

Note: For T-link optical converter specification details (FNC120A- □ □, FNC-130A- □ □) and operation of the converters, refer to the operating instructions (INA-F7465).

(2) System configuration

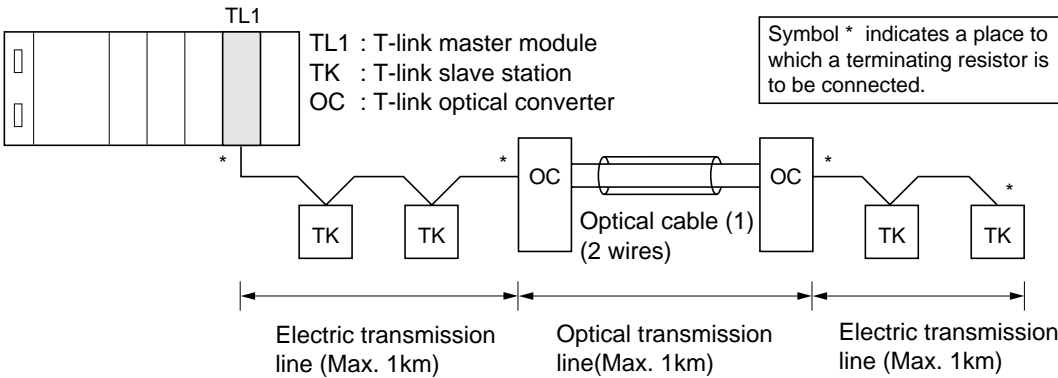
System configurations with optical converters are as follows:

- 1) 1 : 1 connection.....Basic system using two optical converters.
- 2) Cascade connection....System with optical converters connected in series.
- 3) Star connection.....System with optical converters connected in parallel.
- 4) Loop connection.....System with optical converters connected to a loop line.

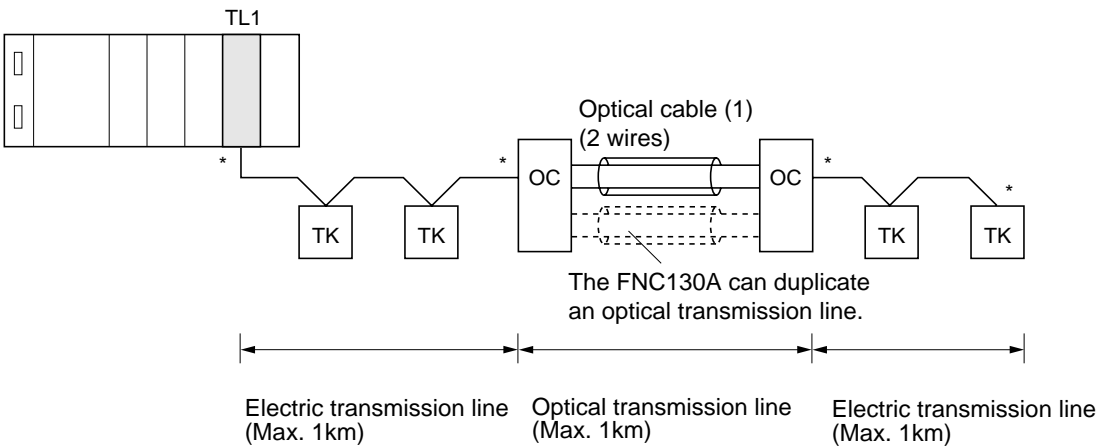
Note: In any system configuration the number of slave stations that can be connected to a master module is up to 32.

1) 1 : 1 connection

<When FNC120A is used>



<When FNC130A is used>

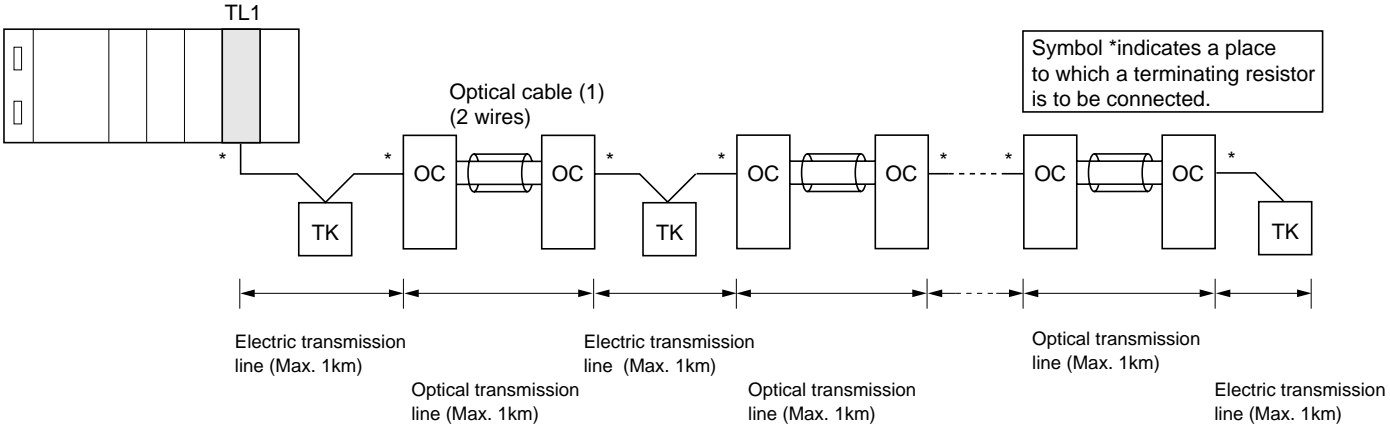


2) Cascade connection

<When FNC120A is used>

This system connects electrical transmission lines and optical transmission lines alternately in series. This system

can contain up to 16 optical converters.



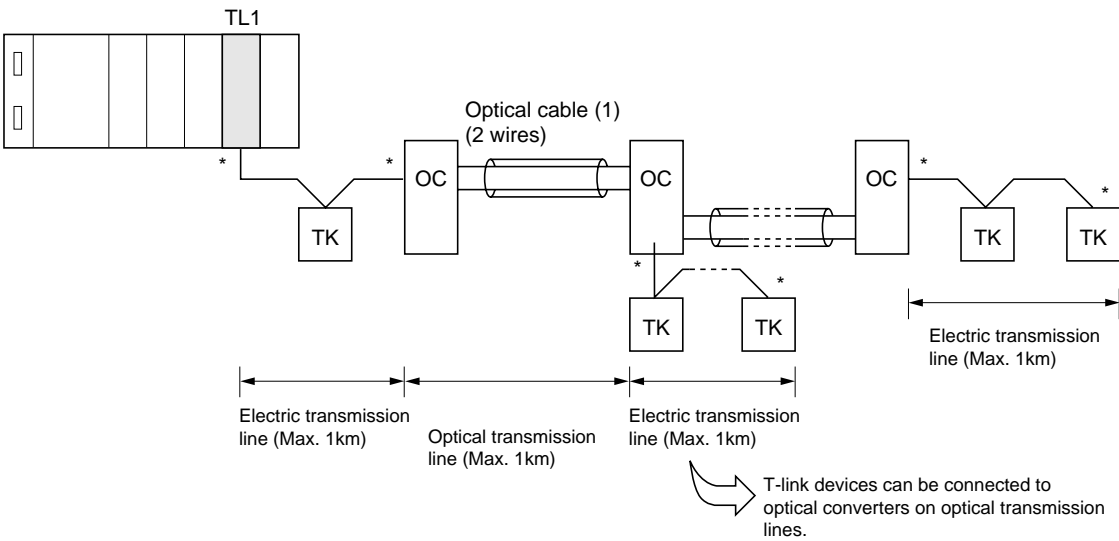
As illustrated above, the optical transmission line can be extended up to 8km and the electric transmission line can be extended up to 9 km with 16 optical converters by alternately

connecting electric transmission lines and optical transmission lines together. The total extendable line length is 17km.

<When FNC130A is used>

This system connects electric transmission lines and optical transmission lines in series. However, this system can be

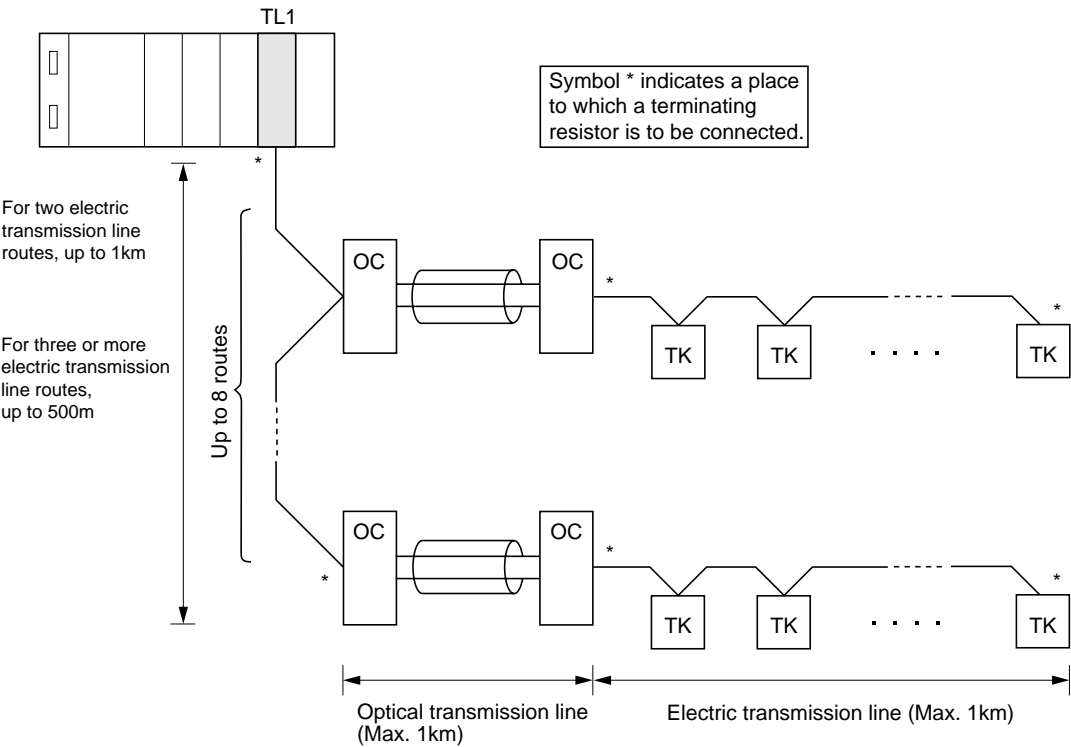
established by connecting only optical transmission lines. This system can contain up to 16 optical converters.



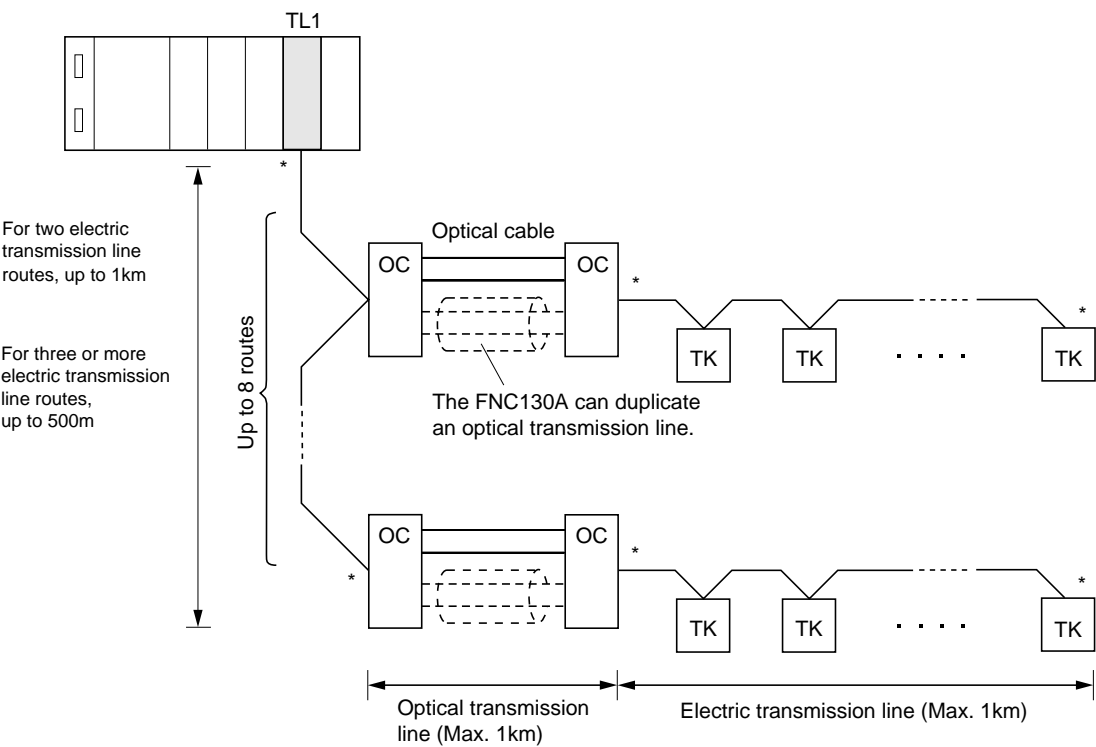
3) Star connection

A star T-link system can be constructed by connecting optical converters to electric transmission lines (up to 8 routes).

<When FNC120A is used>



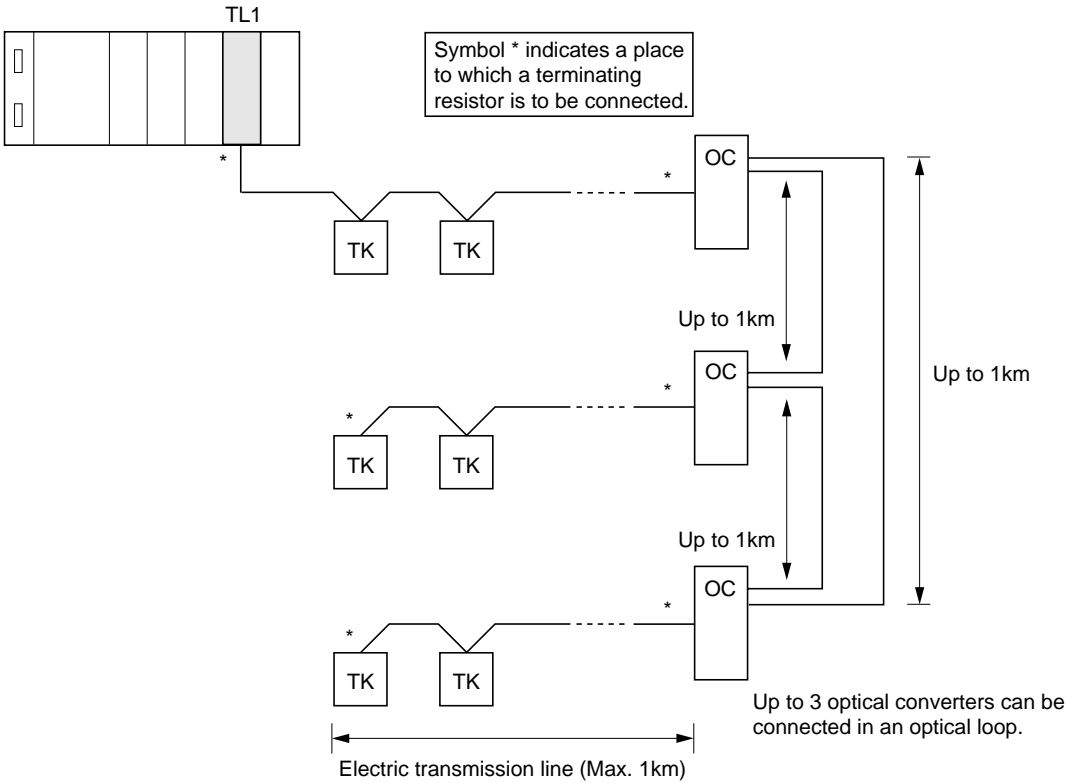
<When FNC130A is used>



4) Loop connection (FNC120A or FNC130A)

The loop connection efficiently implements redundant optical transmission lines. By looping the optical transmission lines,

transmission continues even if a part of the optical cable line is disconnected.



Section 4 System Definitions

	page
4-1 System Configuration Definition	4-1
4-2 Fail-soft Setting	4-7
4-3 Output Hold Definition	4-9

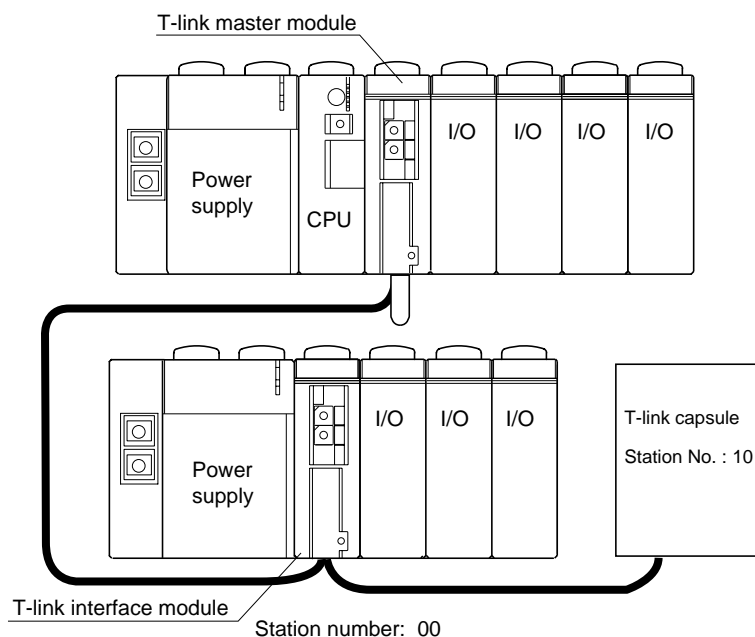
To construct a T-link system in the MICREX-SX series SPH, the system definitions listed below are required.

- System configuration definition (always needed)
- Fail-soft setting
- Output hold definition

Register modules to be used such as CPU modules, T-link master modules, and T-link interface modules, or T-link

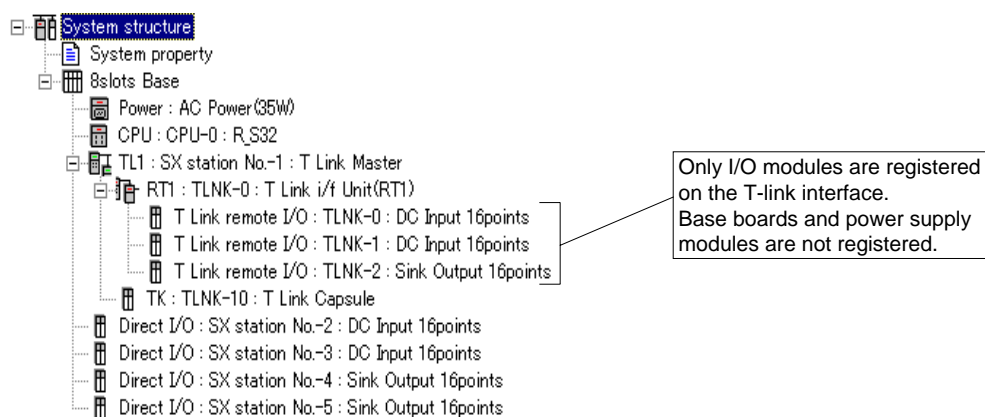
capsules with “System_Definition” in the project tree.

<Example of system configuration>



<System configuration definition tree screen>

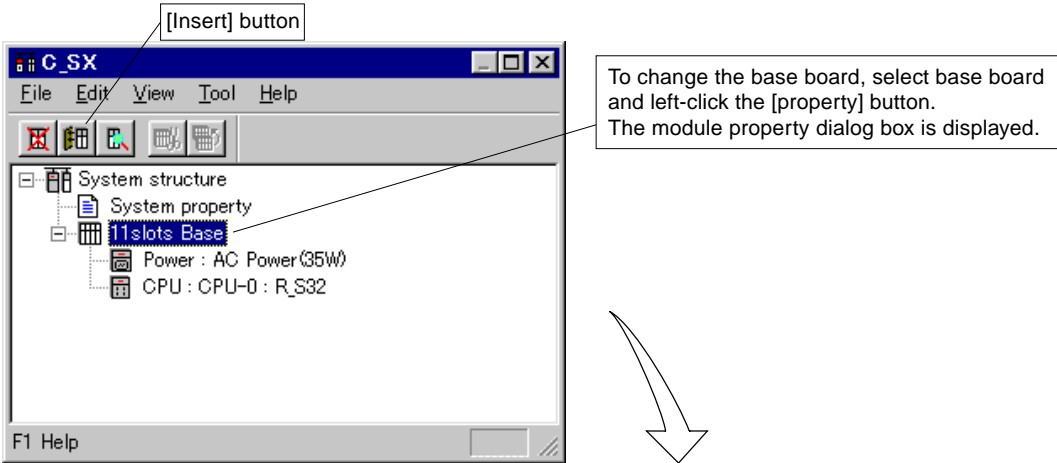
The figure below shows the system configuration definition tree described above.



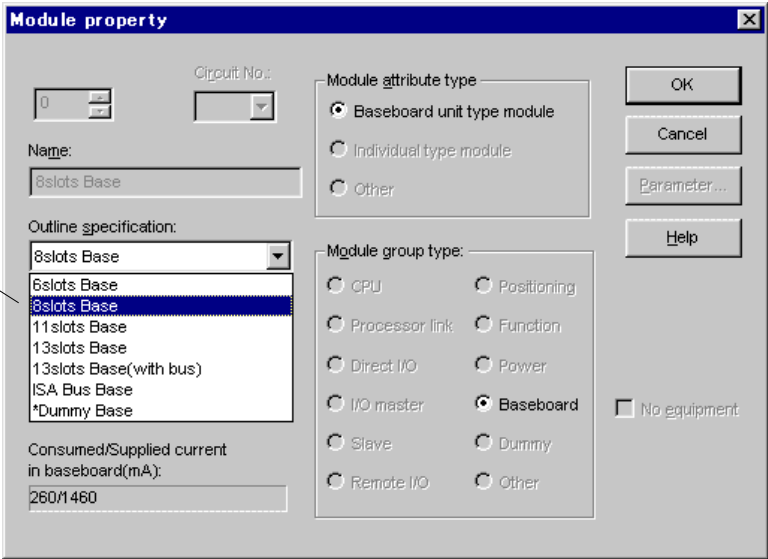
<Setting procedure>

- 1) Double-click the [System_Definition] icon in the project tree with the left button. The system configuration window is displayed. As shown in

the figure below, the window initially displays the 11-slot base board with the registered power supply module and CPU module.

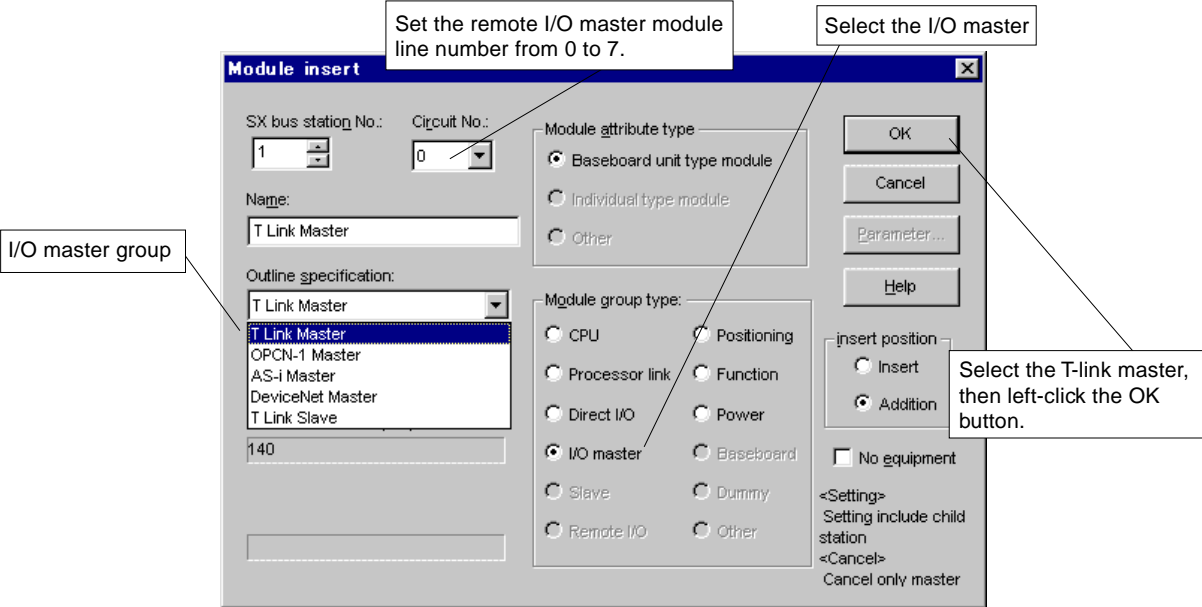


Select the desired base board in this box.

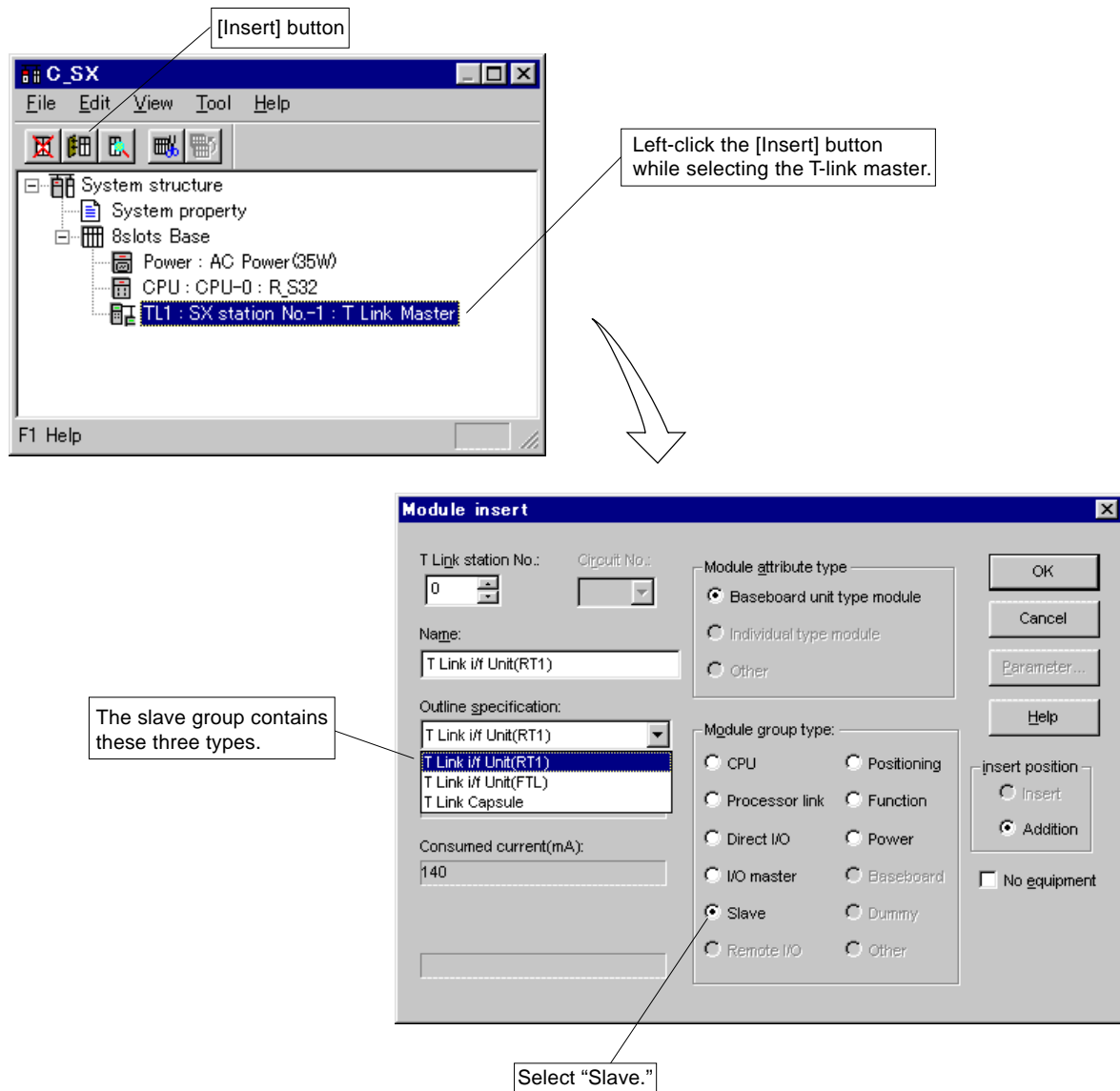


- 2) Register the T-link master module Left-click the [Insert] button on the system configuration

registration window. The “Module insert” dialog box is displayed.



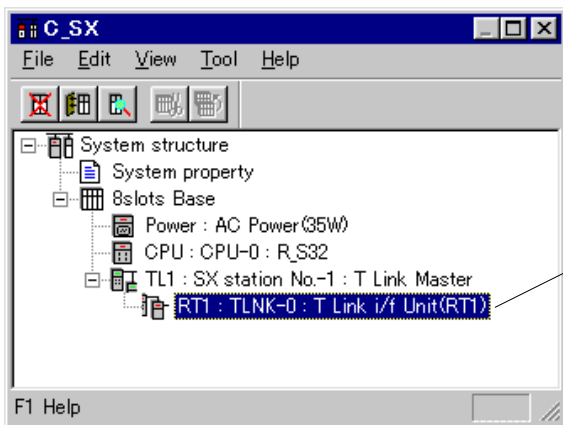
- 3) Register the T-link device (T-link interface module) to be connected to the T-link master module.



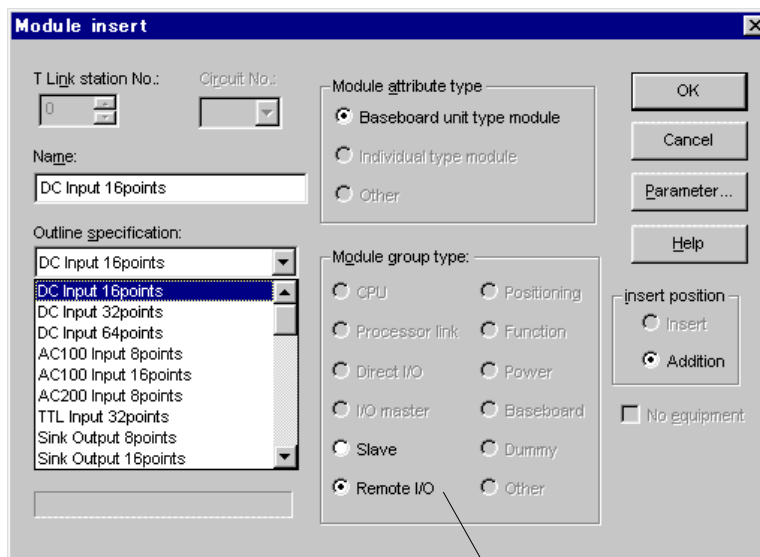
To connect a MICREX-SX SPH T-link interface module, select "T-link i/f unit (RT1)." To connect a conventional MICREX-F series T-link interface

module, select "T-link i/f unit (FTL)." To connect a T-link I/O capsule, select "T-link capsule."

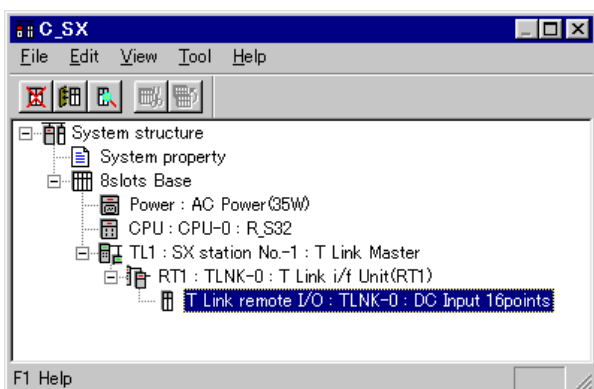
- 4) Register the I/O module to be mounted on the base board which contains the T-link interface (NP1L-RT1).



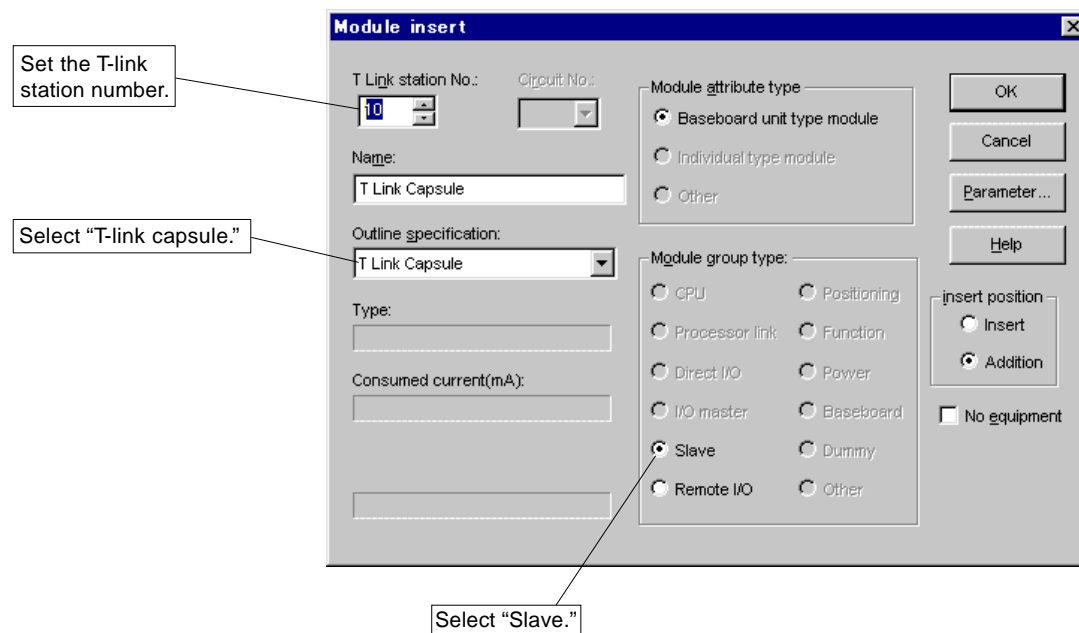
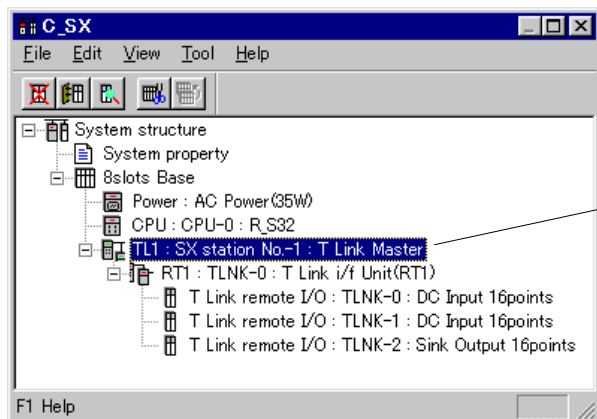
Left-click the [Insert] button while selecting the T-link interface.



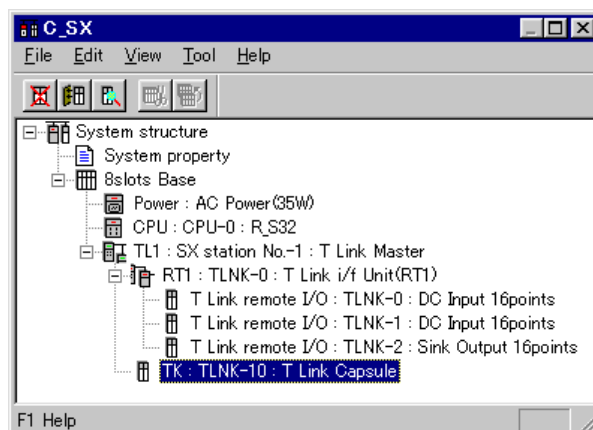
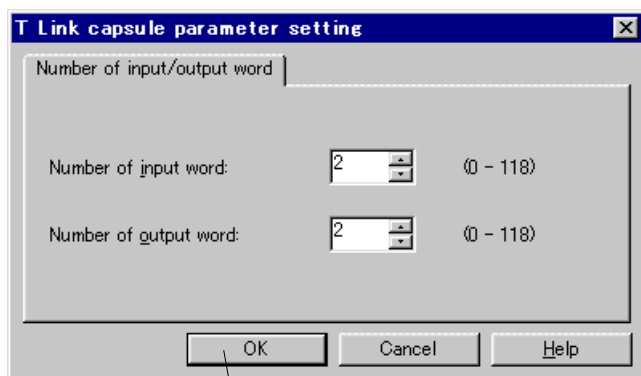
Select "Remote I/O" for the I/O module on the T-link interface (RT1).



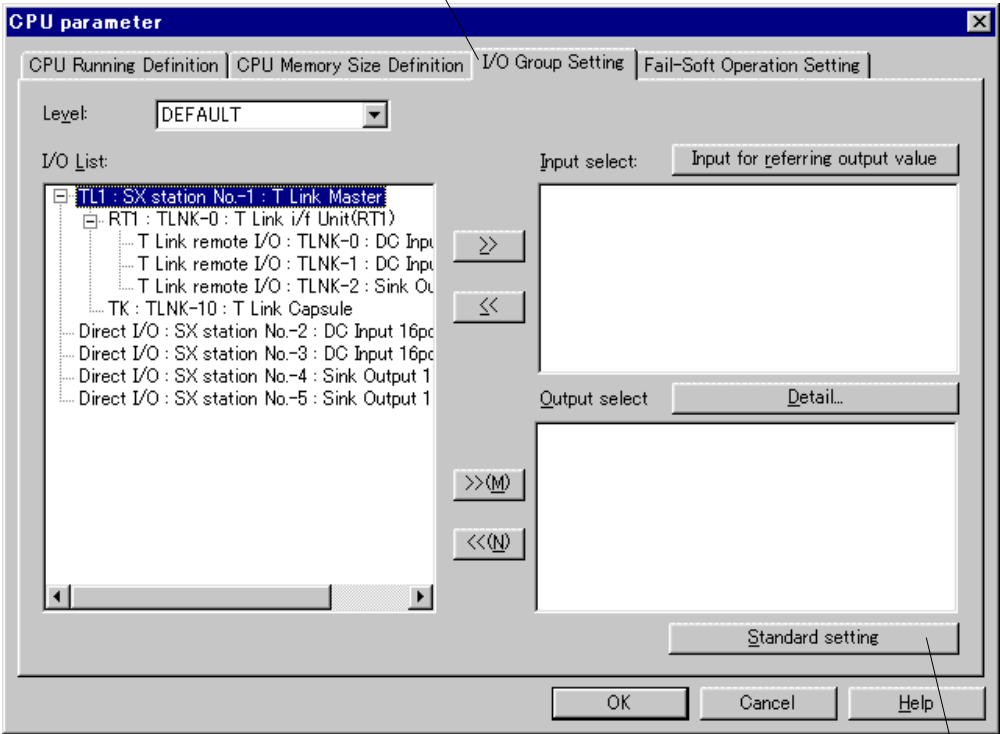
5) Register the MICREX-F series T-link I/O capsule.



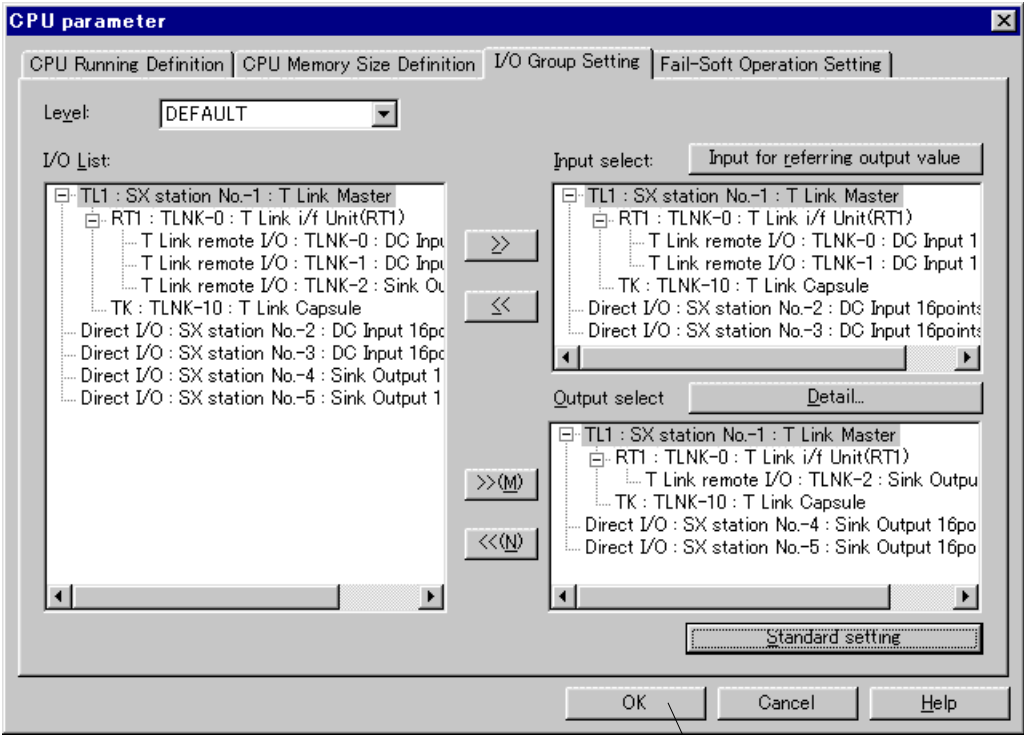
Left-click the [Parameter...] button.
The "T-link capsule parameter setting" dialog box is displayed. Set the number of occupied words.



6) Register the I/O group for the module registered in the configuration. Left-click the [I/O Group Setting] tab in the “CPU parameter” dialog box.



When only one CPU module is used, clicking this button automatically registers all modules/capsules contained in the “I/O list.”



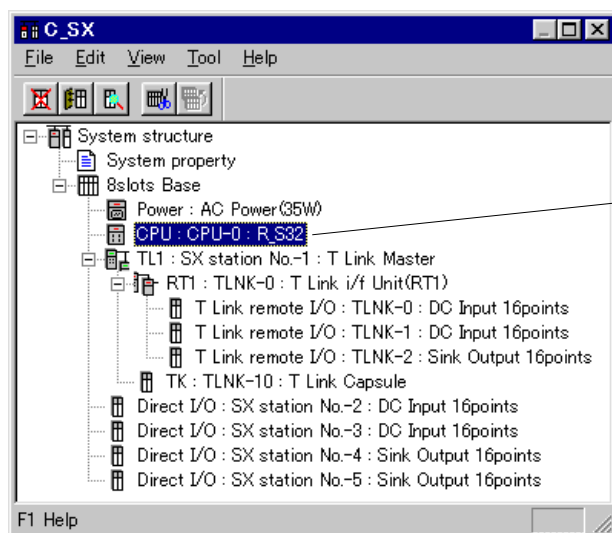
After determining the setting, left-click the [OK] button.

“Fail-soft operation” means to have normal modules/capsules continue their operation even if an error occurs in an I/O module/capsule on the SX bus or T-link.

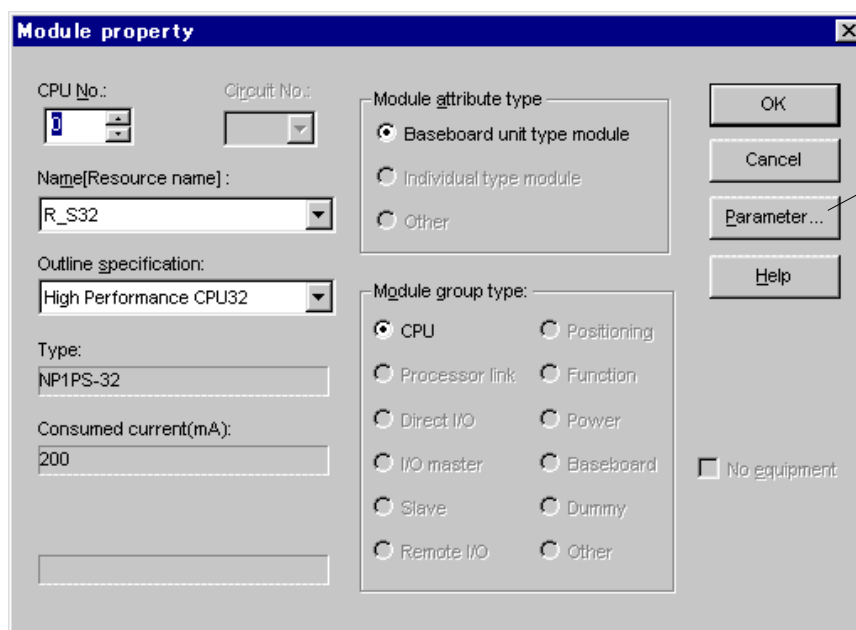
Set “Fail-soft operation” using the “Fail-soft setting” in the CPU module parameter.

<Setting procedure>

- 1) Select the CPU module. The fail-soft setting in the “CPU parameter” dialog box is displayed.



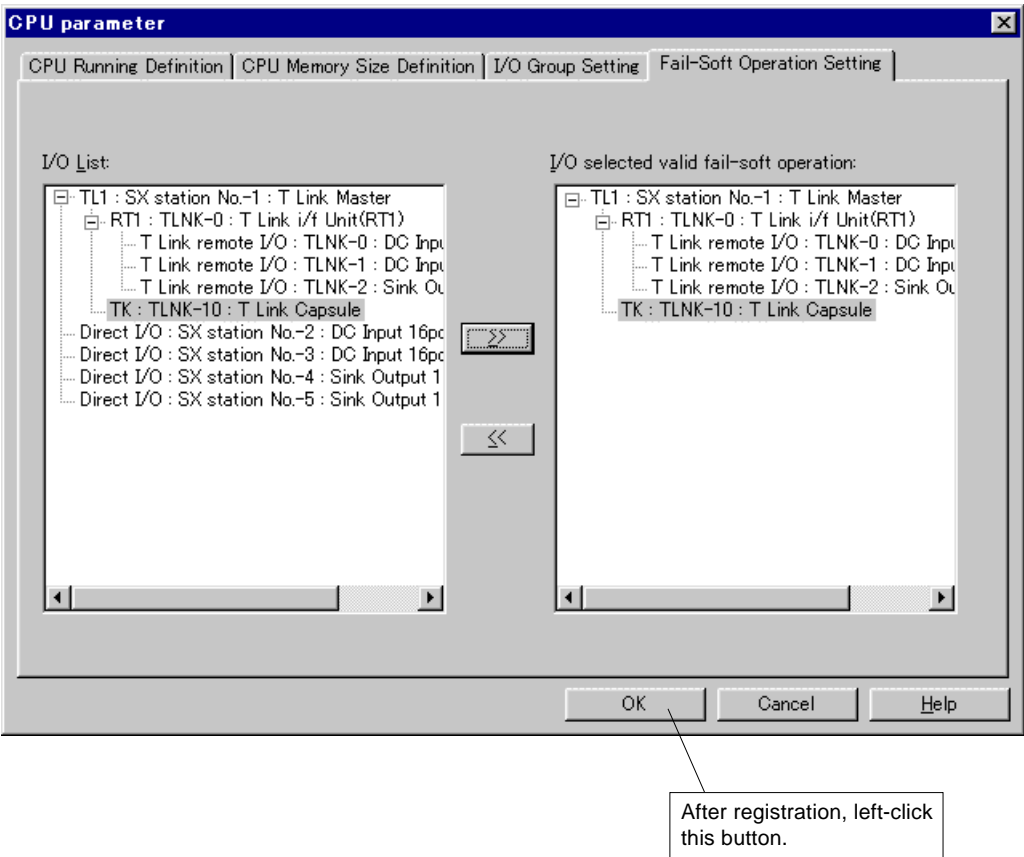
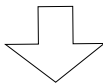
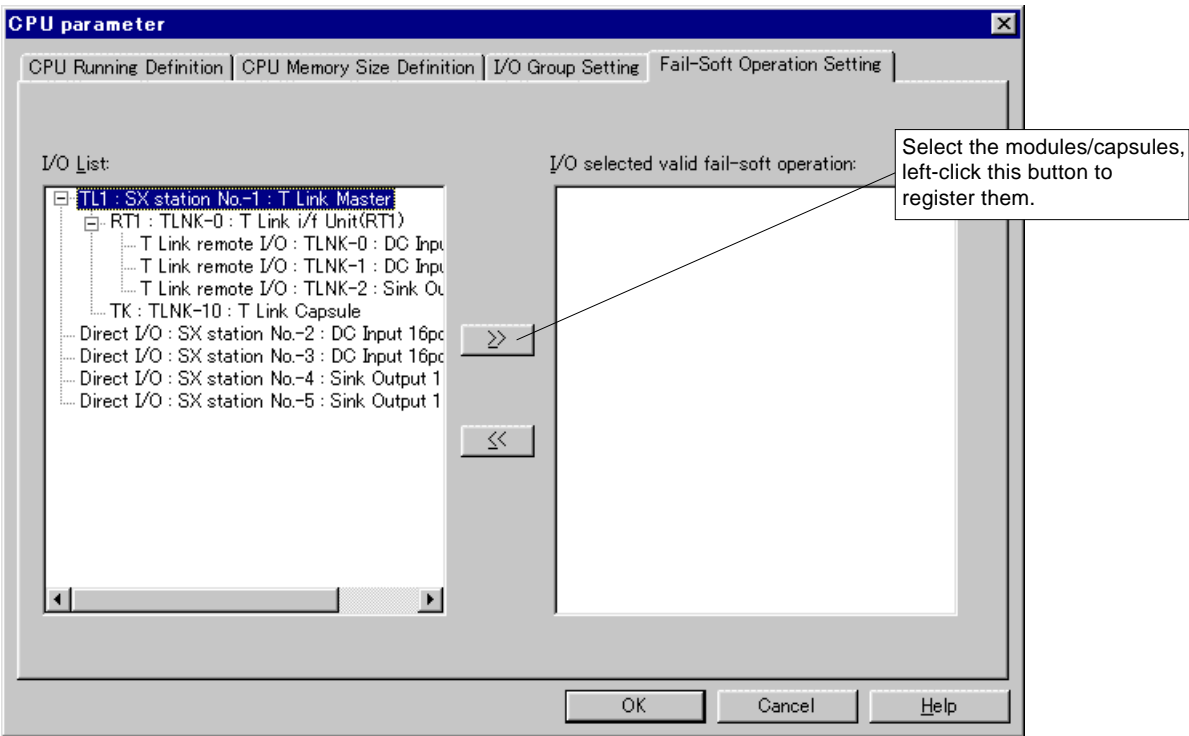
The “Module property” dialog box is displayed.



Key-point

For modules on the SX bus, the CPU does not start operation if the modules registered on the system configuration are not started up. However, specifying the fail-soft setting for devices such as remote I/O modules on the T-link enables the CPU to start operation in a “nonfatal fault” state even if remote I/O modules have not been started up. After the remote I/O modules start up, the “nonfatal fault” state will change to “normal.”

- 2) Select the module/capsuls to specify fail-soft setting for, then register them.



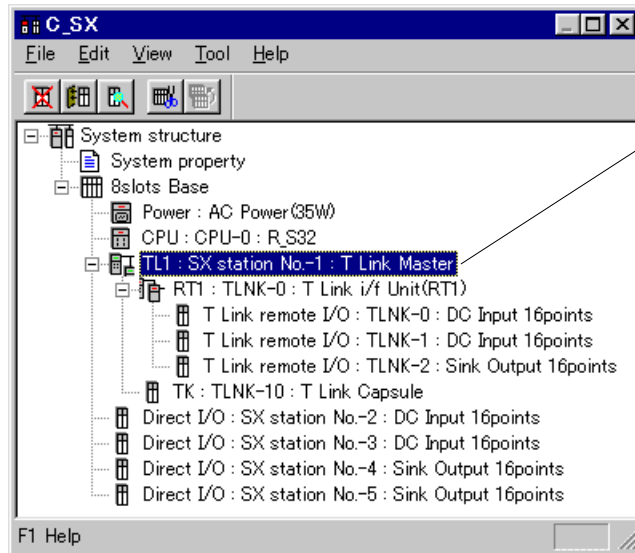
To hold the state which existed immediately before a system fault that stops CPU module operation, or to hold the output immediately before the CPU module stops, use the output

hold facility.

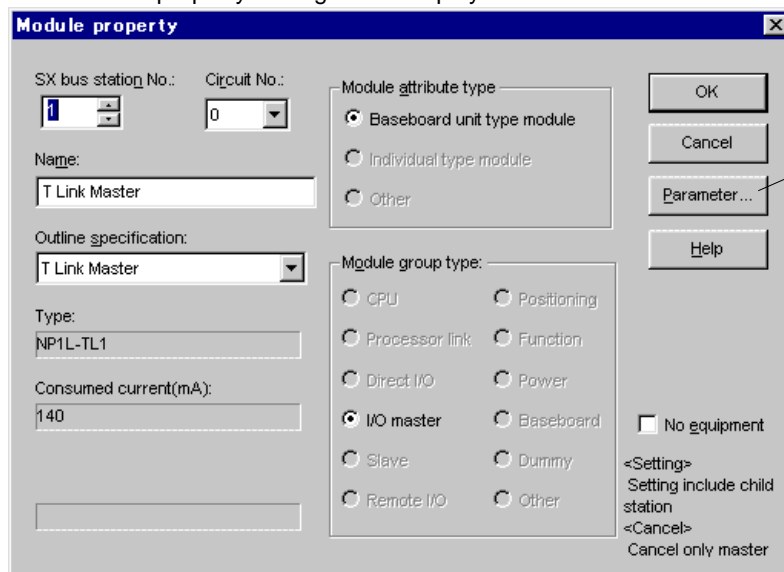
Set the “Output hold” setting using the “Individual output hold station definition” parameter on the T-link master module.

<Setting procedure>

- 1) Select the T-link master module. “The T-link master parameter setting” is displayed.



The “Module property” dialog box is displayed.



- 2) Left-click the station numbers of the T-link devices to be registered with the output hold.

Only the station numbers registered with the system configuration can be selected.

T Link master parameter setting

Individual Output Hold Station Definition

T Link station No.(00-99) ON:Defined OFF:Not defined

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

OK

Cancel

Help

After setting the stations, left-click this button.

Section 5 Wiring

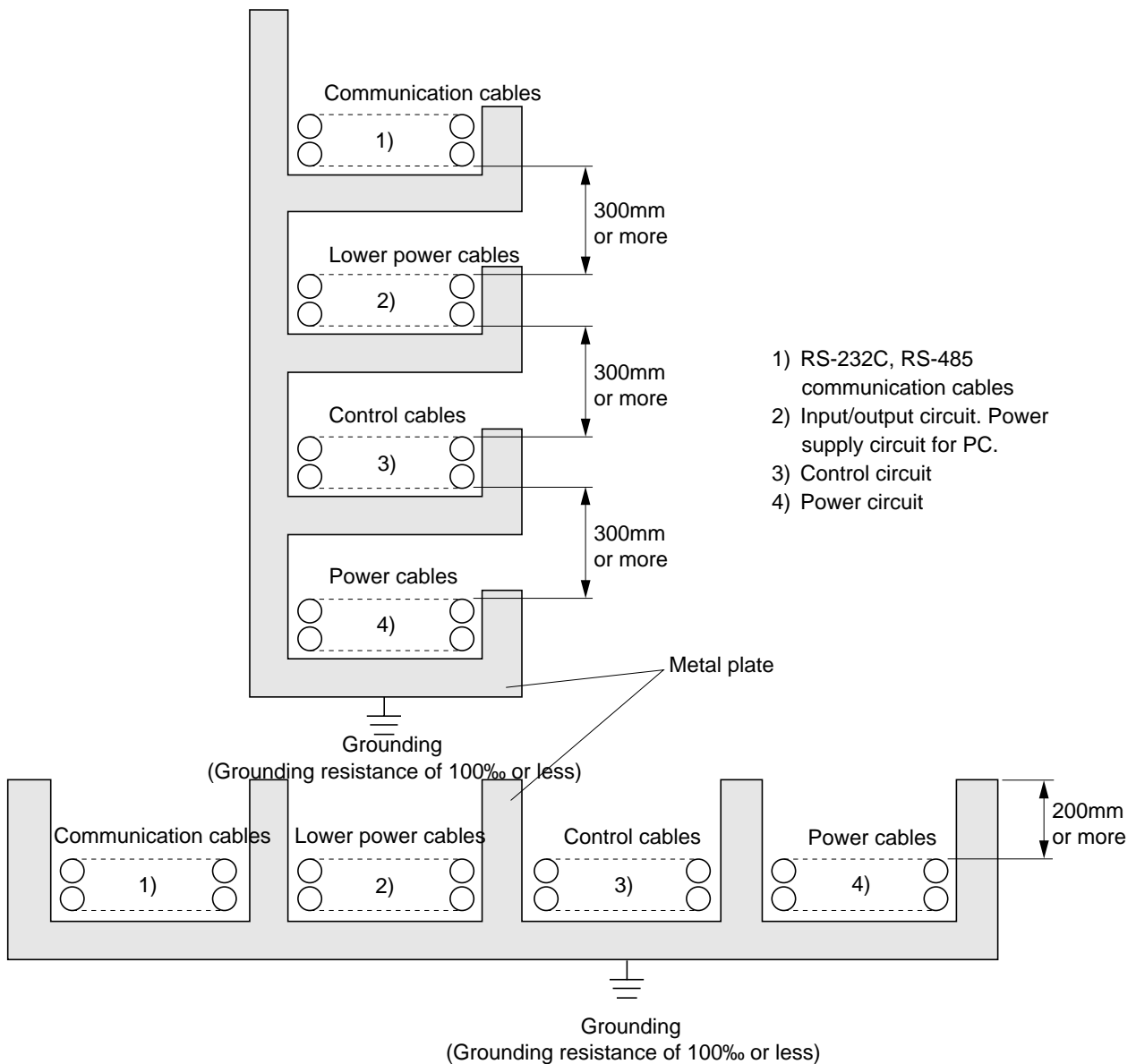
	page
5-1 Precautions	5-1
5-2 T-link Wire Assembling	5-2

Section 5 Wiring

5-1 Precautions

- (1) Before removing the connector, remove the fixing screws.
- (2) T-link cables must be isolated from high-voltage cables and power cables as far as possible. T-link cables must not be run parallel with those cables.

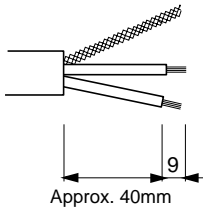
- (3) These cables should be installed as shown in the following figure. Shielding cables should be used.



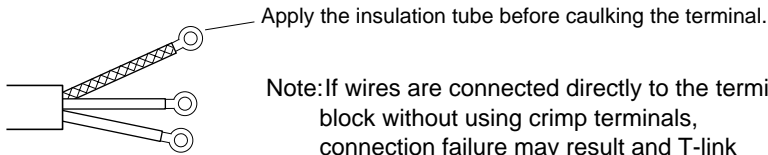
5-2 T-link Wire Assembling

Process the end of a twisted pair cable as shown below.

1) Remove a part of the sheath and internal insulation.



2) Attach crimp terminals.

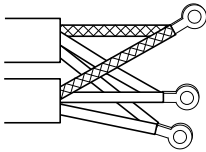


Note: If wires are connected directly to the terminal block without using crimp terminals, connection failure may result and T-link transmission errors may occur. Therefore, crimp terminals must be used.

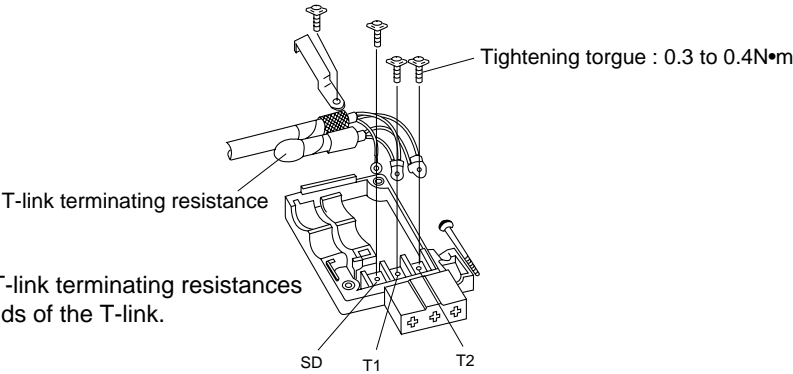
The followings are recommended.

Maker	Type
JST(Nichiatsu)	2-M3
Toei	2-3.5, 2-4S

When two T-link cables are to be connected to one terminal block, each pair of wires can be connected to one crimp terminal for convenience.



3) Assembling



Note: Connect T-link terminating resistances to both ends of the T-link.

Section 6 RAS

	page
6-1 System Memory	6-1
(1) I/O module fault (%MX10.2.5)	6-1
(2) Remote I/O master initialization error (%MX10.25.0 to %10.25.7)	6-1
(3) Remote I/O master-I/O module configuration/fault (%MW10.128 to %MW10.255)	6-2

Section 6 RAS

6-1 System Memory

The system memory area in the CPU module contains flags for remote I/O masters.

(1) I/O module fault (%MX10.2.5)

When an I/O module or remote I/O module on the SX bus that has been registered with an "I/O group" in the CPU

module, but not registered for the fail-soft setting, has a fault, the CPU module stops its operation.

(2) Remote I/O master initialization error (%MX10.25.0 to %10.25.7)

When an error occurs during initialization of a T-link master module, a corresponding bit is turned on.

%MX10.25.0	Initialization error of remote I/O master 0
%MX10.25.1	Initialization error of remote I/O master 1
%MX10.25.2	Initialization error of remote I/O master 2
%MX10.25.3	Initialization error of remote I/O master 3
%MX10.25.4	Initialization error of remote I/O master 4
%MX10.25.5	Initialization error of remote I/O master 5
%MX10.25.6	Initialization error of remote I/O master 6
%MX10.25.7	Initialization error of remote I/O master 7

Note: Specify remote I/O master numbers using the "Insert module" dialog box or "Line number (R)" in the "Module property" dialog box.

For example, specifying "0" for a line number sets the T-link master module "Remote I/O master 0."

6-1 System Memory

(3) Remote I/O master-I/O module configuration/fault (%MW10.128 to %MW10.255)

%MW10.128	Remote I/O master 0
%MW10.135	I/O module configuration
%MW10.136	Remote I/O master 0
%MW10.143	I/O module fault
%MW10.144	Remote I/O master 1
%MW10.151	I/O module configuration
%MW10.152	Remote I/O master 1
%MW10.159	I/O module fault
%MW10.160	Remote I/O master 2
%MW10.167	I/O module configuration
%MW10.168	Remote I/O master 2
%MW10.175	I/O module fault
%MW10.176	Remote I/O master 3
%MW10.183	I/O module configuration
%MW10.184	Remote I/O master 3
%MW10.191	I/O module fault
%MW10.192	Remote I/O master 4
%MW10.199	I/O module configuration
%MW10.200	Remote I/O master 4
%MW10.207	I/O module fault
%MW10.208	Remote I/O master 5
%MW10.215	I/O module configuration
%MW10.216	Remote I/O master 5
%MW10.223	I/O module fault
%MW10.224	Remote I/O master 6
%MW10.231	I/O module configuration
%MW10.232	Remote I/O master 6
%MW10.239	I/O module fault
%MW10.240	Remote I/O master 7
%MW10.247	I/O module configuration
%MW10.248	Remote I/O master 7
%MW10.255	I/O module fault

Remote I/O master-I/O module configuration

When T-link devices connected with a T-link master are normal or in a fault state, flags for corresponding T-link station numbers are turned on.

Remote I/O master-I/O module fault

When T-link devices connected with a T-link master are in a fatal or nonfatal fault state, flags for corresponding T-link station numbers are turned on.

<Flag assignment>

The following tables show an example of flag assignment using the remote I/O master-I/O module configuration fault

(%MW10.128 to %MW10.143). Assignment for remote I/O masters 1 to 7 are handled in the same manner.

<Configuration information>

Word address ↓	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	← Bit address
%MW10.128	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
%MW10.129	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
%MW10.130	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	
%MW10.131	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	
%MW10.132	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	
%MW10.133	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	
%MW10.134	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96	
%MW10.135	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112	

<Fault information>

%MW10.136	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
%MW10.137	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
%MW10.138	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
%MW10.139	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
%MW10.140	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
%MW10.141	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80
%MW10.142	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96
%MW10.143	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112

<T-link slave station (remote I/O) state diagnosis>

States of T-link slave stations can be diagnosed using the configuration information and fault information.

	Configuration information	Fault information
Normal	ON	OFF
Nonfatal fault	ON	ON
Fatal fault	OFF	ON

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